# ENGINEERING AND MINING JOURNAL

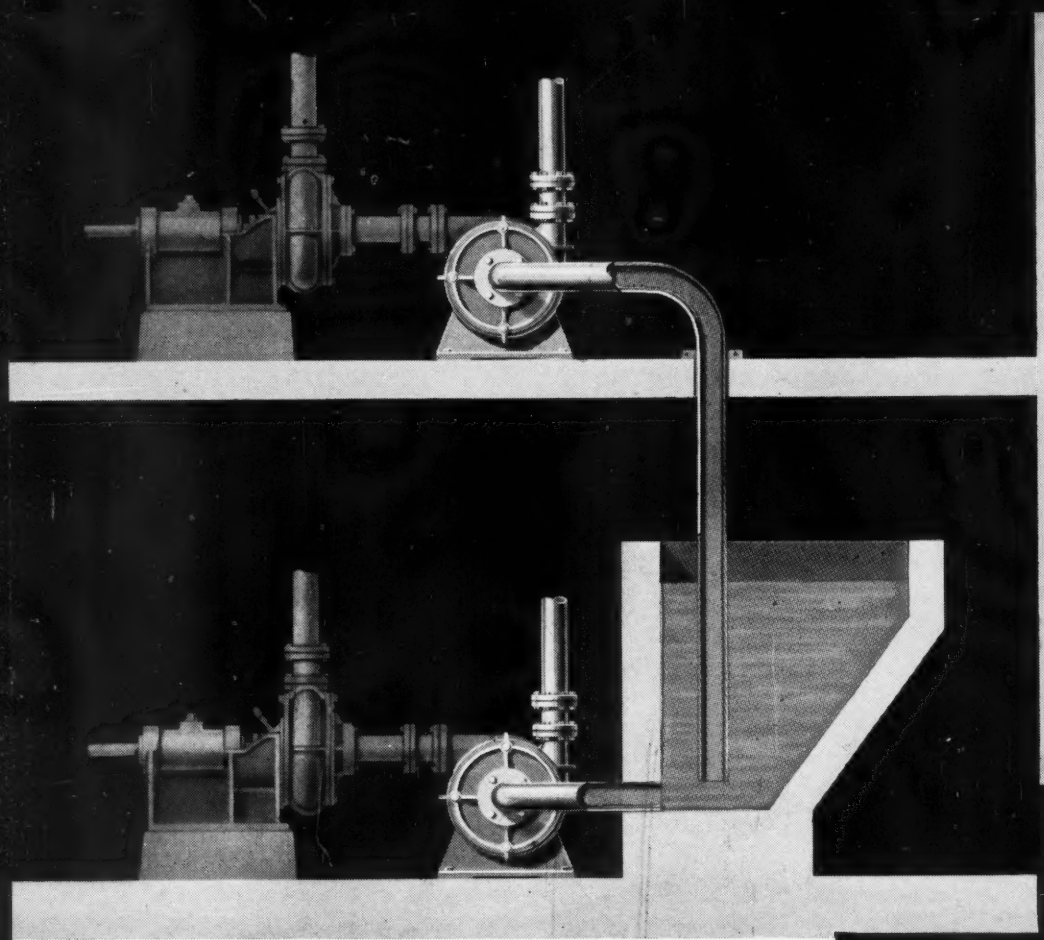
A McGRAW-HILL PUBLICATION

JANUARY, 1948

*Schoenfeld Collection, from Three Lions.*

Gold miners in California a hundred years ago

A Salute to California's Golden Centennial—Page 52



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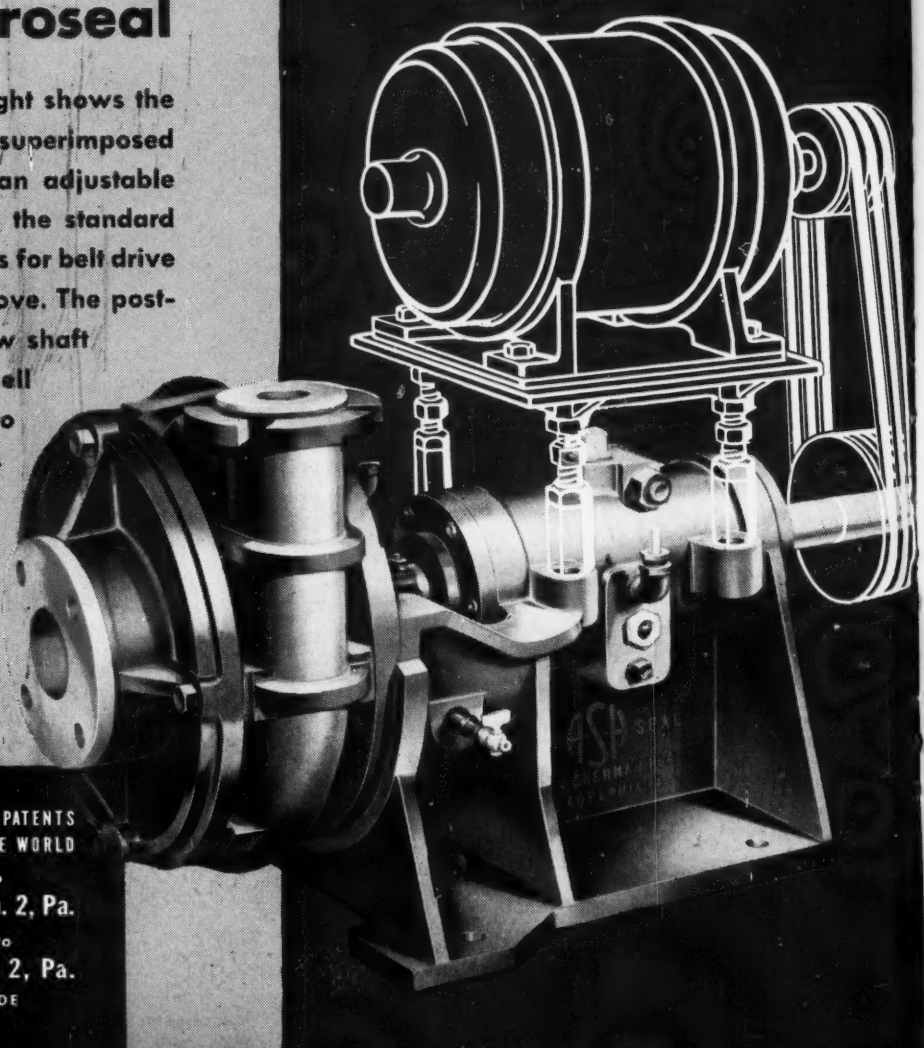

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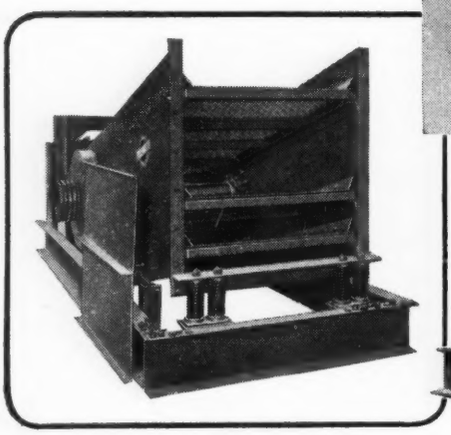

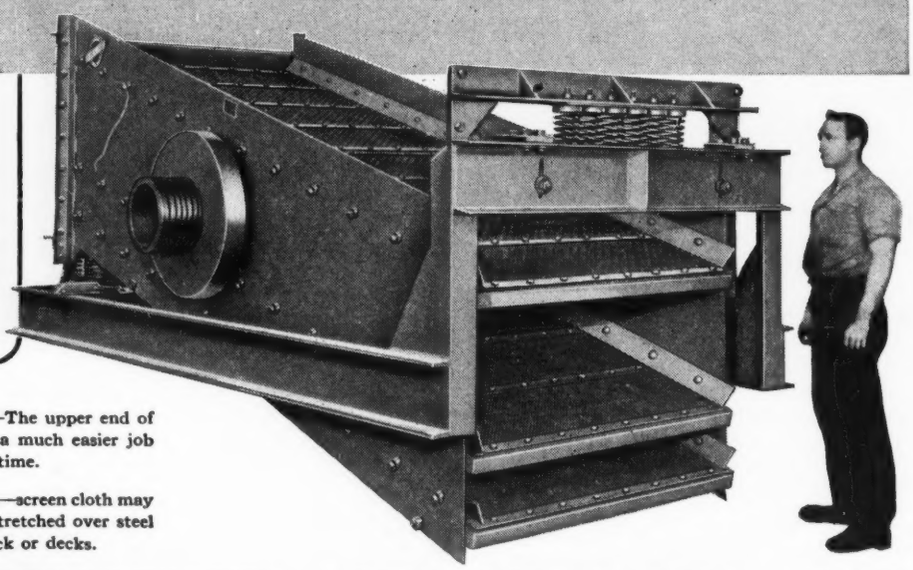

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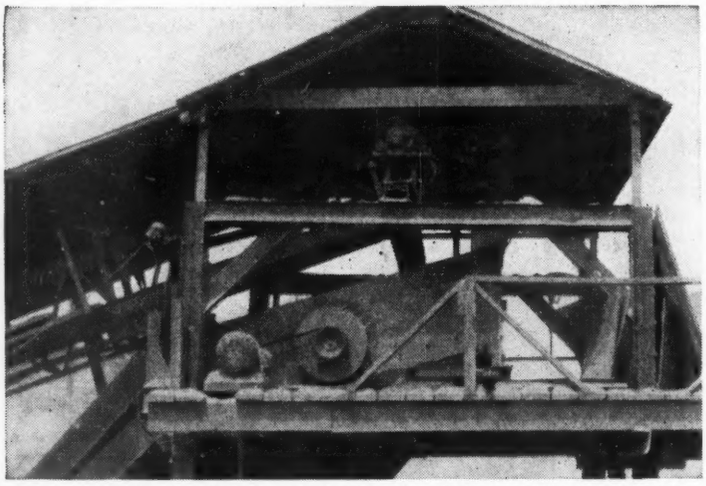

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ENGINEERING AND MINING JOURNAL

JANUARY, 1948

# Raw Materials Are Fundamental Wealth

IT IS INTERESTING to note how people are swinging around to a realization of the value of raw-material wealth, after centuries of viewing mere trade as more important.

This changed viewpoint is evident at many points. The self-sufficiency policies set up by many industrially undeveloped nations, such as Brazil and India, are conditioned in part by the attitude that raw materials have sold too cheaply in the past and that to export them in crude form results in disproportionately small rewards to the countries of origin. Because, by and large, raw materials have sold in buyers' markets, such nations seek a portion of the more ample rewards that come from processing and fabrication, or high tax revenues from raw material exports.

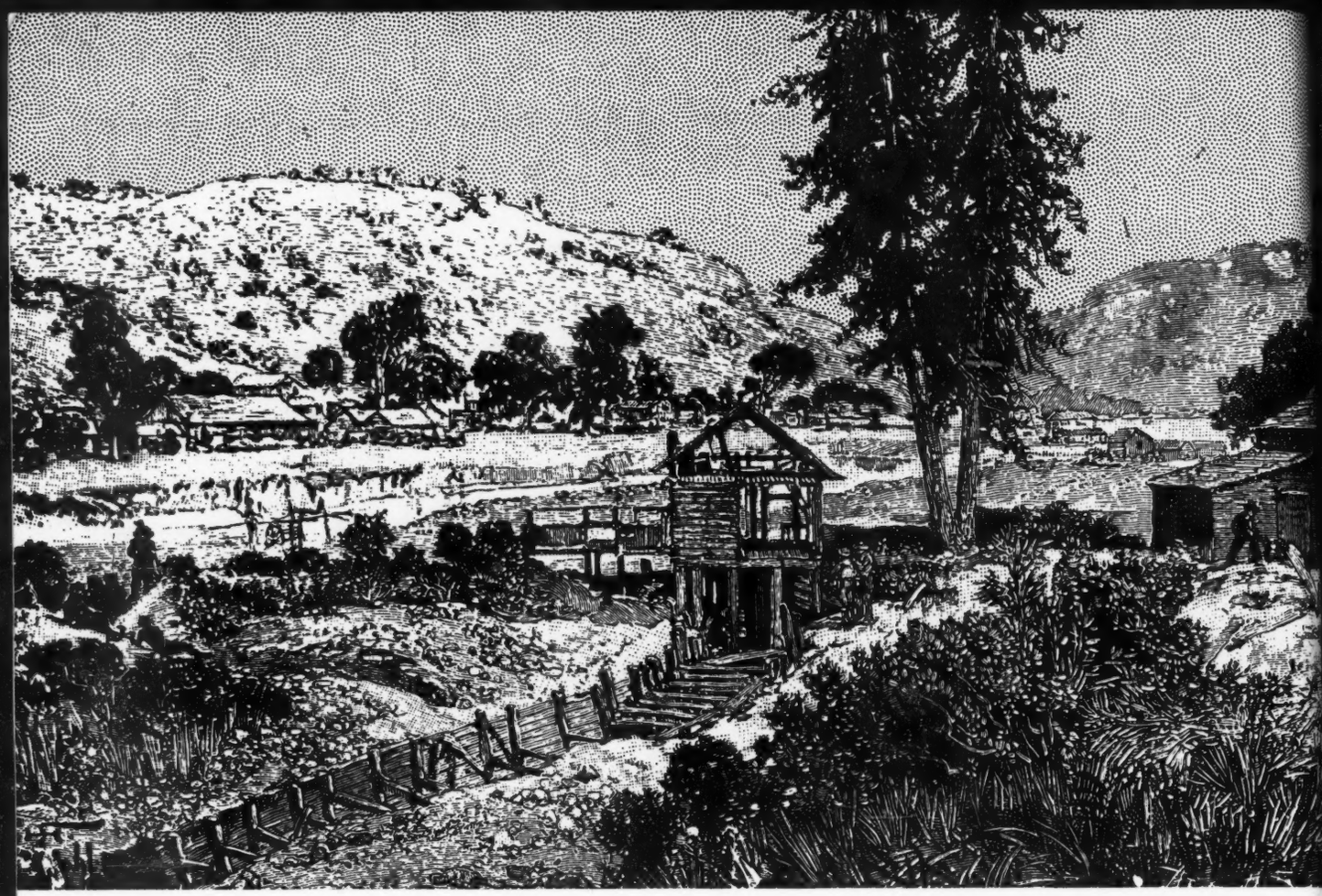
In this country, the campaigns over our alleged "have-not" status in many minerals have given the public and politicians a new sense of the importance of raw materials. Unfortunately, these campaigns have also broadcasted a grossly distorted idea of our actual self-sufficiency; nevertheless they have driven home a healthful realization of the vulnerability of nations which lack raw materials in variety and abundance.

Thus we find the entire public taking an interest in strategic material stockpiling, as evinced by numerous items in the popular press. We find the Government, in weighing the Marshall Plan, scrutinizing the ability of our natural resources to stand the drain. We see the Harriman committee and the Herter Congressional committee recommending that the United States should demand eventual repayment of part of Marshall Plan outlays in the form of minerals. We perceive the Government long indifferent to the fate of American mineral producers in the foreign field, now planning on seeking an open door to American interests in the colonies of beneficiary countries as partial recompense for aid. All these activities signify growing realization that national strength and accessibility to an abundance of raw materials go hand in hand.

The now forgotten Atlantic Charter took note of the importance of raw materials by sponsoring "enjoyment by all states, great or small, victor or vanquished, of access on equal terms to the trade and to the raw materials of the world which are needed for their economic prosperity." Nobody ever took the trouble to explain what constituted equality of access or how it was to be accomplished, but it was evident that the drafters of the document were sensitive to the contention of the Axis countries that they were forced to war by being squeezed on raw materials.

We have always been skeptical of the old idea, still cherished in some quarters, that a country enjoys a favorable trade balance when it exports more than it imports and thus balances a net outflow of goods with a net inflow of money or credit. Considering that the goods had intrinsic worth and incorporated irreplaceable resources, while credits historically have deteriorated either from devaluation or repudiation, the fallacy in calling such a condition "favorable" is self evident. The fact that a national economy seems to function better under such circumstances merely denotes a spurious quality in the mechanism of trade. That this spurious quality is real and not theoretical is evident from the absurdities in which we participate, such as killing little pigs, pouring kerosene on potato harvests, and giving away goods and services on a national scale, all for the alleged purpose of keeping our economy in balance.

The day is dawning, in our opinion, when the pouring of resources down ratholes to please producers, manufacturers and merchants will be recognized as nonsense, and the use of resources will be viewed as more advantageous than paper profits from their sale. A by-product of this changed attitude, we feel sure, will be greater public recognition of the extractive industries and their problems. Concomitantly with this recognition will come public insistence on conservational management and the risk of confiscatory legislation if the industry should fail to safeguard the public interest in conducting its affairs.



*Schoenfeld Collection, from Three Lions.*

**AT SUTTER'S MILL,** January, 1848, James Marshall's discovery of gold ushered in a truly Golden Century.

# SALUTE TO THE

HENRY BIGLER got out his diary that evening, turned to a fresh page, and laboriously scratched into it these words:

*"Monday, 24th. This day some kind of mettle was found in the tail race that looks like goald. First discovered by James Martial, the boss of the mill."*

The time was January, 1848. The place was Sutter's new saw-mill up in the Coloma Valley in California. The "mettle" did, indeed, turn out to be "goald," as Mr. Bigler, a worker in the mill crew, recorded in his diary the following Sunday.

Thus quietly began the most fruitful hundred-year period in the history of the world. James Marshall's discovery marked a turning point in world affairs. It opened a Golden Century, during which a mounting flood of gold from the world's mines helped push industrial and scientific achievement to undreamed-of heights.

Now the Golden Century has ended, its close being marked by discovery of a power infinitely more potent for good or ill than gold. The course of civilization from here on will be set by the use mankind makes of the energy within the atom.

## Gold Was Welcome

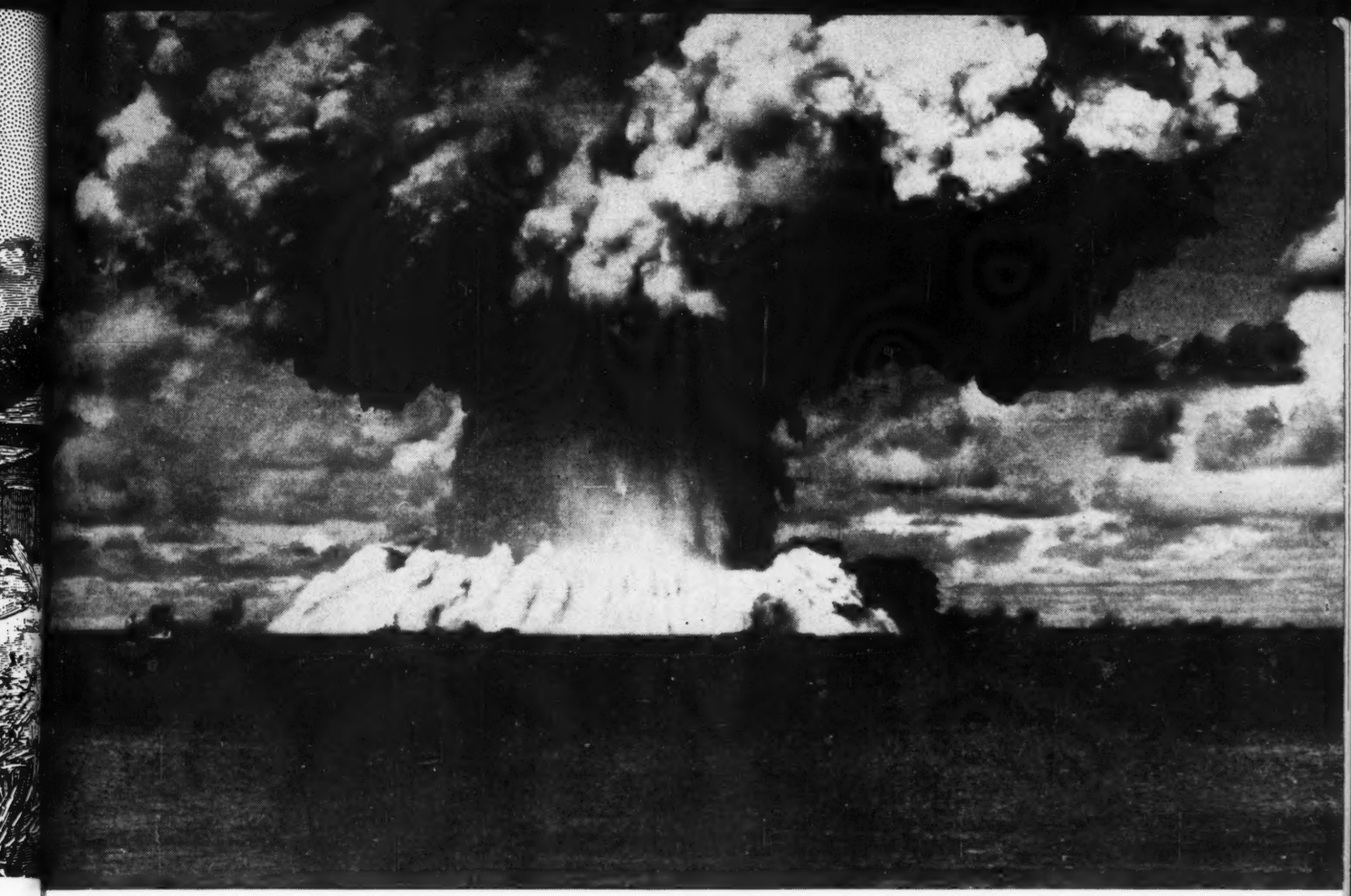
In the United States in 1848, the echoes of the Mexican War were just dying away. Men were excited, casting about for new things to try, new places to see. The West lay on the threshold of development; railroads and heavy industries were ready for expansion. People needed a spark for the imagination and money to finance the ideas they were ready to create.

Gold in California provided both the spark and the money. The pot of gold at the end of the rainbow had become real. Both the inspiration and the hard money stimulated business, energized credit, accelerated invention. Factories sprang up, railroads crept westward out across the plains. The development of California gave a practical reason for bridging the continent, and the facilities created sped the development of all the area from the Mississippi to the Pacific.

Money talked in those days. People spent freely, but they spent on things that developed the country. Venture capital abounded. Agriculture and manufacturing developed on a wide front. The mining industry expanded into many ramifications. California, itself, grew into a self-sufficient empire, distinguished for the vigor and progressiveness of its citizens.

Before 1848, the United States never mined more than about $1,000,000 in gold annually. In 1850, California yielded over $50,000,000 in gold, and it held that yearly pace until 1860. California, alone, has contributed over $2,000,000,000 in gold to the Golden Century.

Railway mileage grew from 9,021 miles in 1850 to 193,346 miles by 1900. The foreign commerce of the United States expanded from $243,743,000 in 1850 to $1,898,837,000 in 1900. By 1940, U. S. foreign



Joint Army and Navy Task Force Photo

**AT BIKINI,** July, 1946, the fifth atomic bomb marks the Golden Century's end and the launching of a new era.

# GOLDEN STATE

trade stood at $6,646,525,000. Gold was not, of course, responsible for all of this, but it played an important part.

Not only gold mining, but all mining was on flood tide. In 1850 the iron mines of the United States yielded 1,000,000 tons of ore. In 1940, 74,000,000 tons was mined. Total value of U. S. mineral production in 1880 was $367,463,000. By 1940 it had expanded to $5,582,500,000.

## Progress in Prospecting

The beginning of the Golden Century opened a golden age for the prospector. In 1850, many rich orebodies were lying about the United States, at or near the surface, waiting for someone to find them. Those were the days when a grub stake could lead to a fortune, when an individual could build an empire!

Not so today! Somewhere in that part of the earth's crust that is called the United States there must certainly still lie huge undiscovered orebodies, as rich as any that have been mined. But it takes more than a sturdy constitution and a grub stake to find them now. The modern prospector fills trucks with his drilling, surveying, and geophysical tools, and he even goes soaring about in helicopters to carry his instruments over ground he couldn't cover in any other way. The airborne magnetometer is indeed a far cry from James Marshall, poking his forefinger at a few yellow flakes in his palm and wondering if they could be gold.

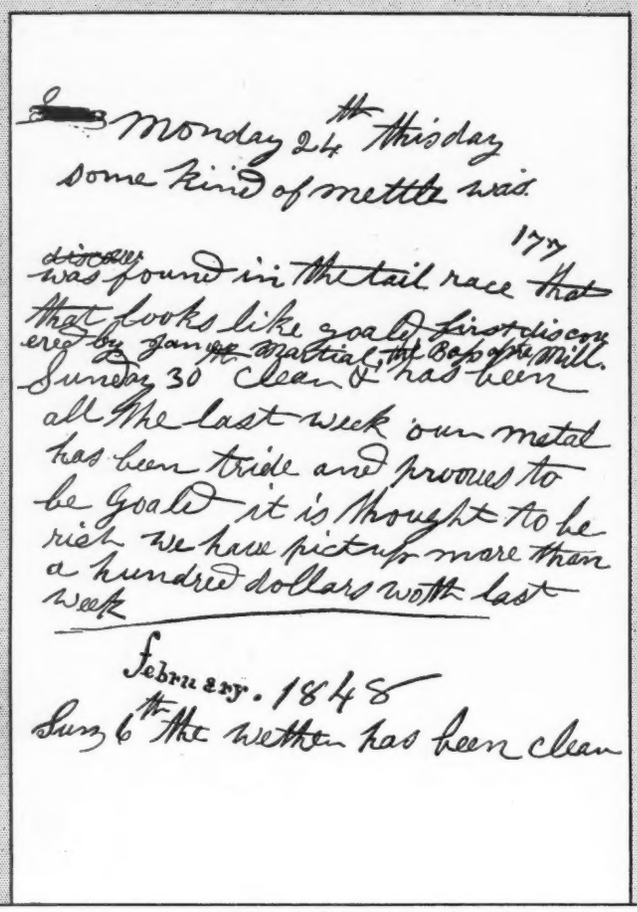
Gold mining, too, has come a long way from the methods used by the Forty-Niners. Contrast the old rocker or the early sluice boxes with the mammoth dredges that have been developed in California. In 1848, bedrock had to be within shovelling distance or you couldn't reach it. Nowadays Yuba No. 20, for example, digs easily down to 125 ft. below the waterline, carries a 50-ft. bank ahead of the dredge, and does it at the rate of twenty-one 18-cu. ft. buckets each minute.

Underground mining as we know it today really got its start on the Comstock, which was opened in 1859. Deidesheimer's invention of the square-set method of mining gave the industry great impetus. The great heat met in the Comstock workings also forced miners there to work out ventilation schemes that seemed quite advanced then. By dint of terrific effort, the Comstockers managed to drive their stifling-hot workings down to 3,000 ft. or more below the surface.

## Mining Goes Deeper

Today 3,000 ft., even in "hot" mines, is ordinary. Modern air conditioning units, high-performance pumps, and better mining methods have enabled today's miners to plan seriously to mine as deep as 10,000 ft. below the surface.

When the Golden Century opened, mines had to be high grade to stand the high cost of mining and milling

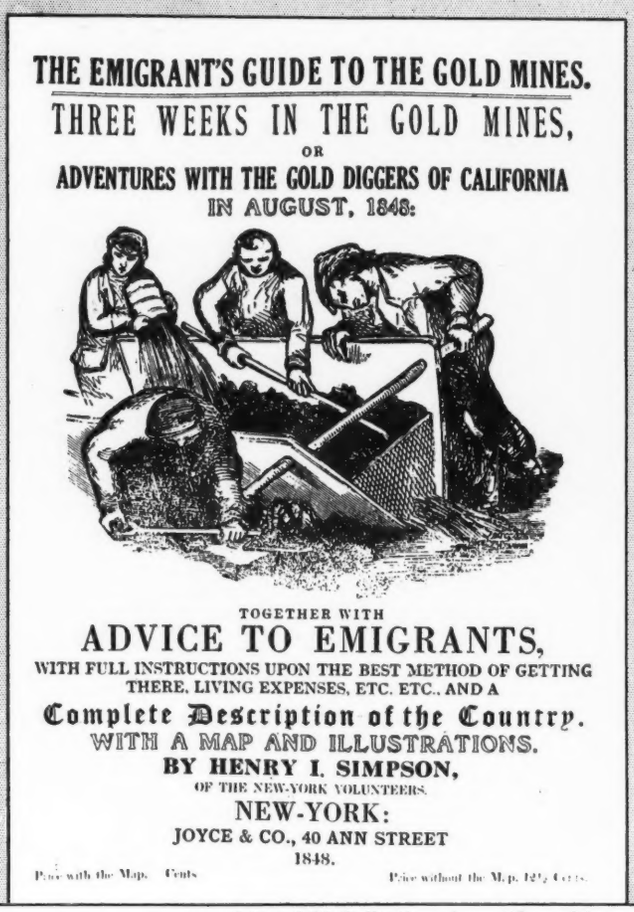


Monday 24th this day
some kind of mettle was
discovered
was found in the tail race that
that looks like gold first discovered by James Marshall the Boss of the mill.
Sunday 30 Clean & has been
all the last week our metal
has been tride and proves to
be Gold it is thought to be
rich we have picked more than
a hundred dollars worth last
week

February. 1848
Sun 6th the wether has been clean

*Schoenfeld Collection, from Three Lions.*

**IN HIS DIARY, Henry W. Bigler, a worker in the crew that built Sutter's new saw mill, recorded Marshall's discovery and the confirmation that gold had been found.**



THE EMIGRANT'S GUIDE TO THE GOLD MINES.

THREE WEEKS IN THE GOLD MINES,

OR

ADVENTURES WITH THE GOLD DIGGERS OF CALIFORNIA
IN AUGUST, 1848.

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**OUTFITTING AND TRANSPORTING emigrants to California was as profitable for some people as mining gold. This was one way of cashing in on goldfield fever.**

by the methods used in those days. In contrast, today's mines are nearly all low grade, and costs have had to be cut to the bone. The classic example until recently was Alaska Juneau, where a profit was made for years on ore that ran only 87c per ton in gold. Caving methods, such as used at Alaska-Juneau, now move huge tonnages of rock at a speed and with an economy of manpower that would have dumbfounded the old miners on the Comstock.

## Mining Is Mechanized

No better symbol for modern mining could be found than the mechanical loader. Working from a rock floor, a good man with a muckstick could load a ton of rock in about 30 minutes. A good man with a mucking machine can do it in one minute. Hand shovelling is probably getting to be a lost art.

The trend in modern mining is of course toward more and more mechanization. This is shown clearly by the fact that coal and metal mining together use more electric power than any other industry in the United States. The total is now 22,506,124,000 kwh. annually, with metal mining taking over 75% of this. Such a vast consumption of energy for mining would have been simply inconceivable to the miners of 1848.

## Harder to Concentrate

Early-day ore dressing was characterized by simplicity and crudity. Much good work was done by the gravity concentrating methods and the amalgamation plates of 1848, but it is a fact that the tails of those early mills would have made excellent mill feed today.

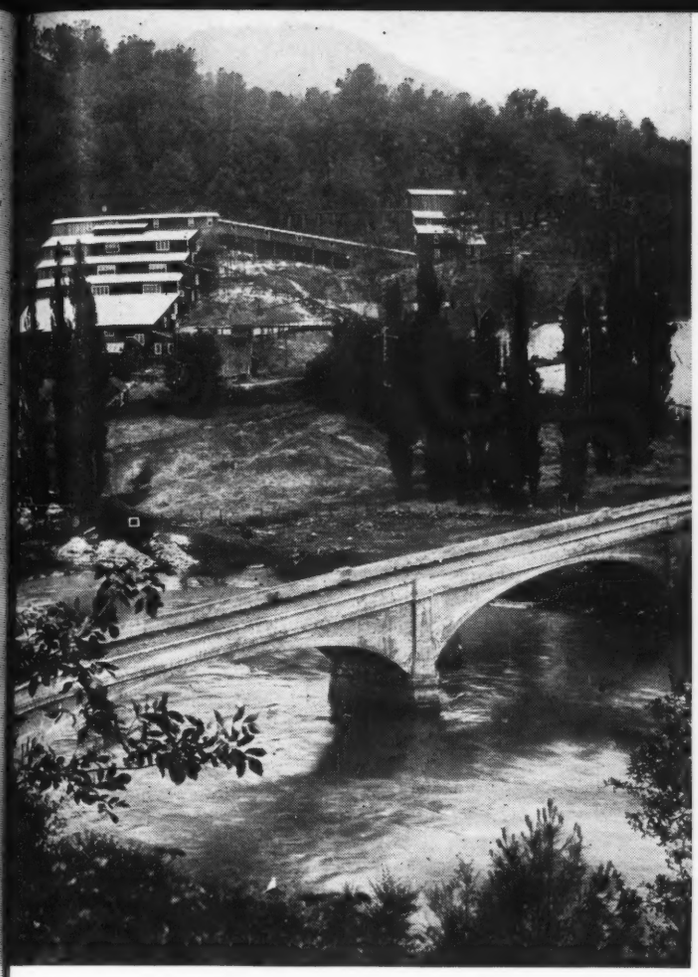
A mill man from the old-time Mother Lode would scarcely recognize a modern mill. He would see familiar things here and there, like crushers, and perhaps ball mills. But their size would startle him, and he would be mystified by flotation and cyanidation. The crowning touch to his bafflement would come when someone would try to explain things like automatic controls, the polarograph, or even the simplest aspects of the chemistry of flotation. This is not at all to the discredit of the old-timer. Things are just done differently these days, and the low-grade complex ores that are left to us have demanded much more complex treatment.

It is worth noting, however, that in one respect ore dressing seems to be moving ahead by going in circles. Gravity methods, plus amalgamation, were about all the 1848 millman had to work with. Then along came cyanidation and flotation, and gravity receded in importance. Now we seem to have come full circle, and as the Golden Century ends, gravity concentration devices head the list of "new" ore-dressing techniques.

## Smelters Have Changed

The smelter, too, has changed radically in the last century, although gold, itself, is purified at the mine in pretty much the same way it was back in 1850. However, it is quite another story with the gold that is produced by the large base metal mines, which include some of our largest gold producers.

The blast furnaces that smelted copper, lead, and zinc ores in the early days couldn't handle the con-



THE PLEASANTEST MINING COUNTRY in the world surrounds some of California's gold producers. This view of Carson Hill's mill is typical of Mother Lode scenery.

GOLD DREDGING, started in 1898 along the Feather and the Yuba rivers, developed rapidly. Dredges will probably account for three-fourths of California's 1947 yield.

centrates sent to them when mills began using Wilfley tables and, later, flotation machines. The whole art of reverberatory smelting had to be developed, and the modern practice of sintering had to be worked out before the fine flotation concentrates could be smelted profitably.

These reverberatories produced a low grade matte, which in turn gave rise to development of the basic-lined barrel-type converter. Gold and silver ores, desired for their silica content, could be smelted right along with the matte.

Where the old smelters wasted fortunes on slag, dust, and fume losses, modern smelters extract the next-to-the-last penny by improved control, better furnace design, and by electrical fume precipitation, multi-cyclones, and baghouses. The slag fuming process for zinc is but one example of the lengths modern techniques can go to recover the last bit of metal.

Finally, the whole science of electrometallurgy was completely unknown in 1848. Electrolysis had been accomplished earlier in the laboratory, but the first commercial electrolytic refinery was not set up until 1883, when copper was refined in this manner. Lead was also refined electrolytically in 1883, but zinc was not electro-deposited commercially until 1915.

One would like to have been able to take one of the Comstockers down to Las Vegas, Nevada, and show him the Basic Magnesium electrolytic plant when it was running during the war. That mile of electrolytic tank houses spread out across the desert, and all producing a metal he had never heard of, might well strain his credulity to the breaking point. Even to us, it still seems a little unreal.

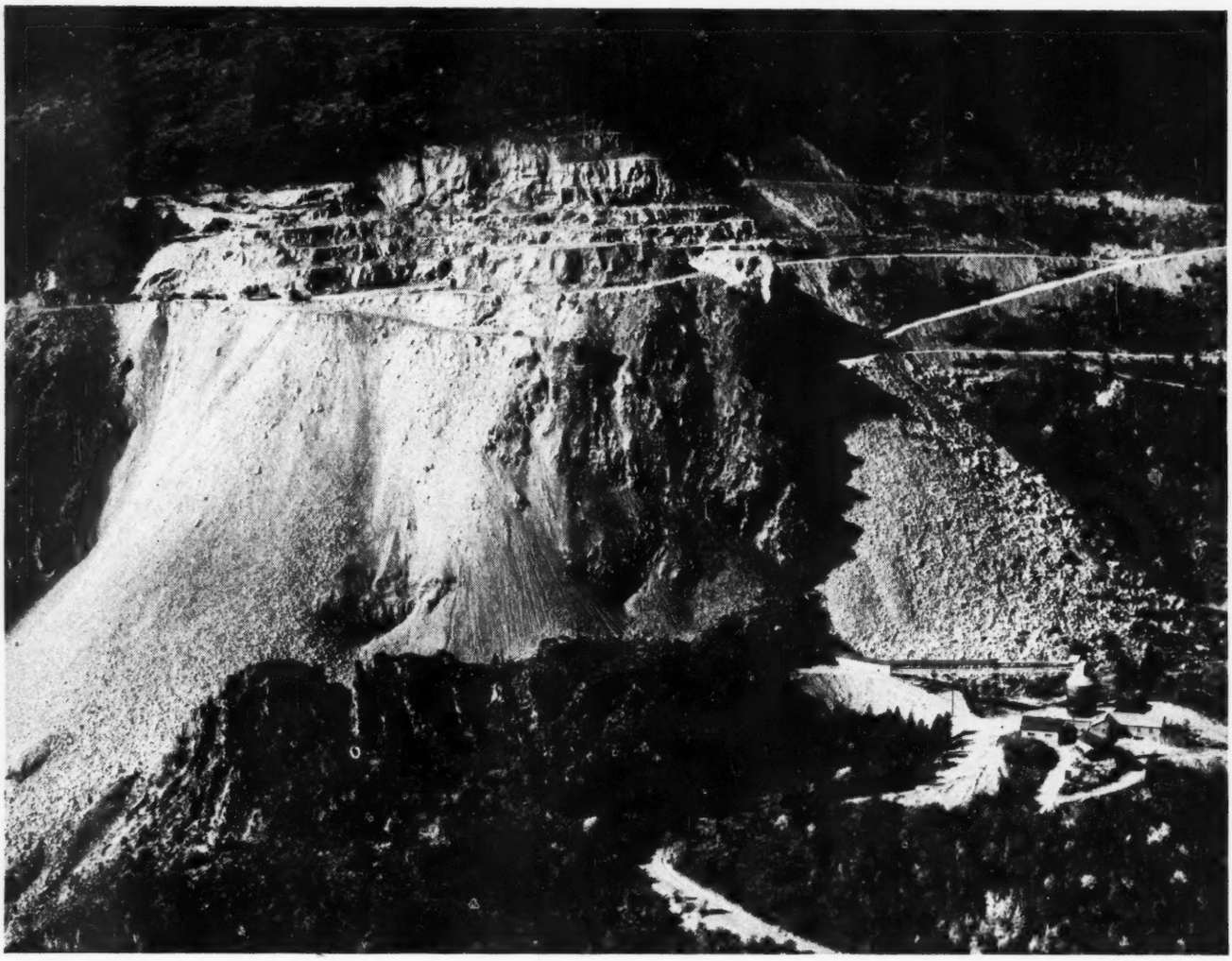
## End of an Era

One cannot but be proud of an industry like mining that has come so far and done so much in the last hundred years. Great as the demands upon it have been, the mining industry of the United States has not failed to meet them. Even the demands of the greatest and costliest metallurgical project of all time, that of the Atomic Energy Commission, are being faithfully met. Mining supplied the gold that began the Golden Century; mining supplies the raw materials for the release of atomic energy that marks the end of it.

Here we stand, then, on the threshold of a new era, but we face a prospect of world-wide devastation and discord. We see a new vicious form of slavery on the march. We see tools of incalculable destructivity placed in the hands of people who have not even learned to administer local government fairly, honestly, or economically.

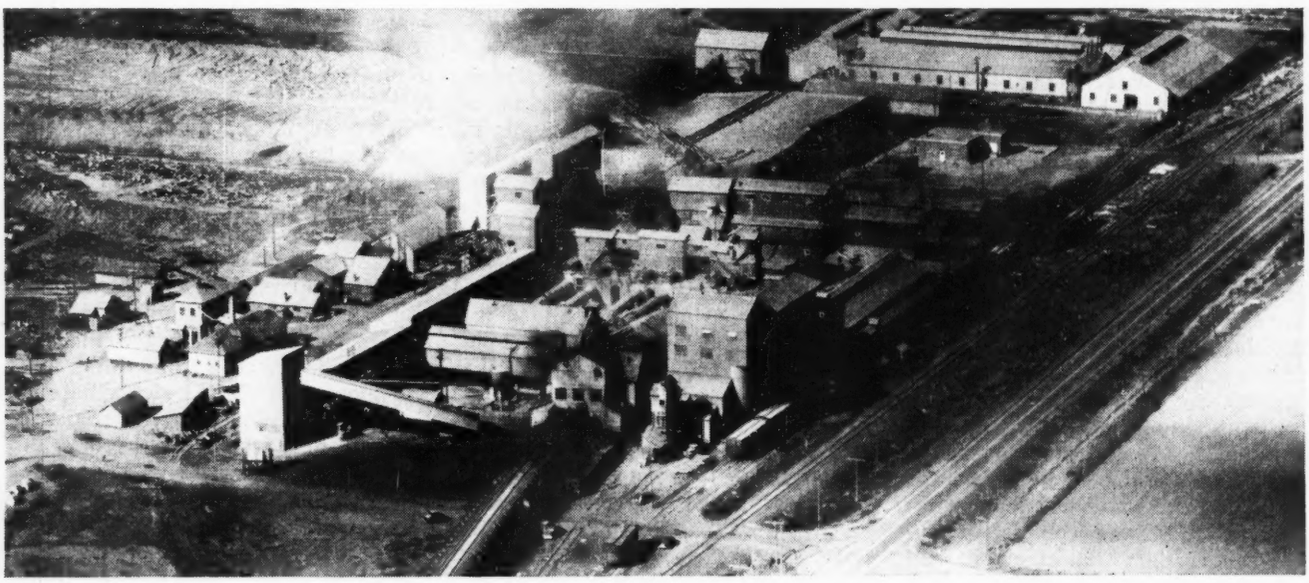
Here at home, many observers are wondering not if, but when, we shall be visited by even more harrowing depressions than those of the past. We may be pardoned, therefore, this nostalgic look back at the opportunities, accomplishments, and good living of the Golden Century that is passing.

In this new era that faces us, we know that California will continue to contribute to the nation's mineral production, and from its creative human resources, for many years to come. Therefore, because of the part it has played in the past, and for the part it will play in the years to come, *Engineering and Mining Journal* salutes the State where the Golden Century began.

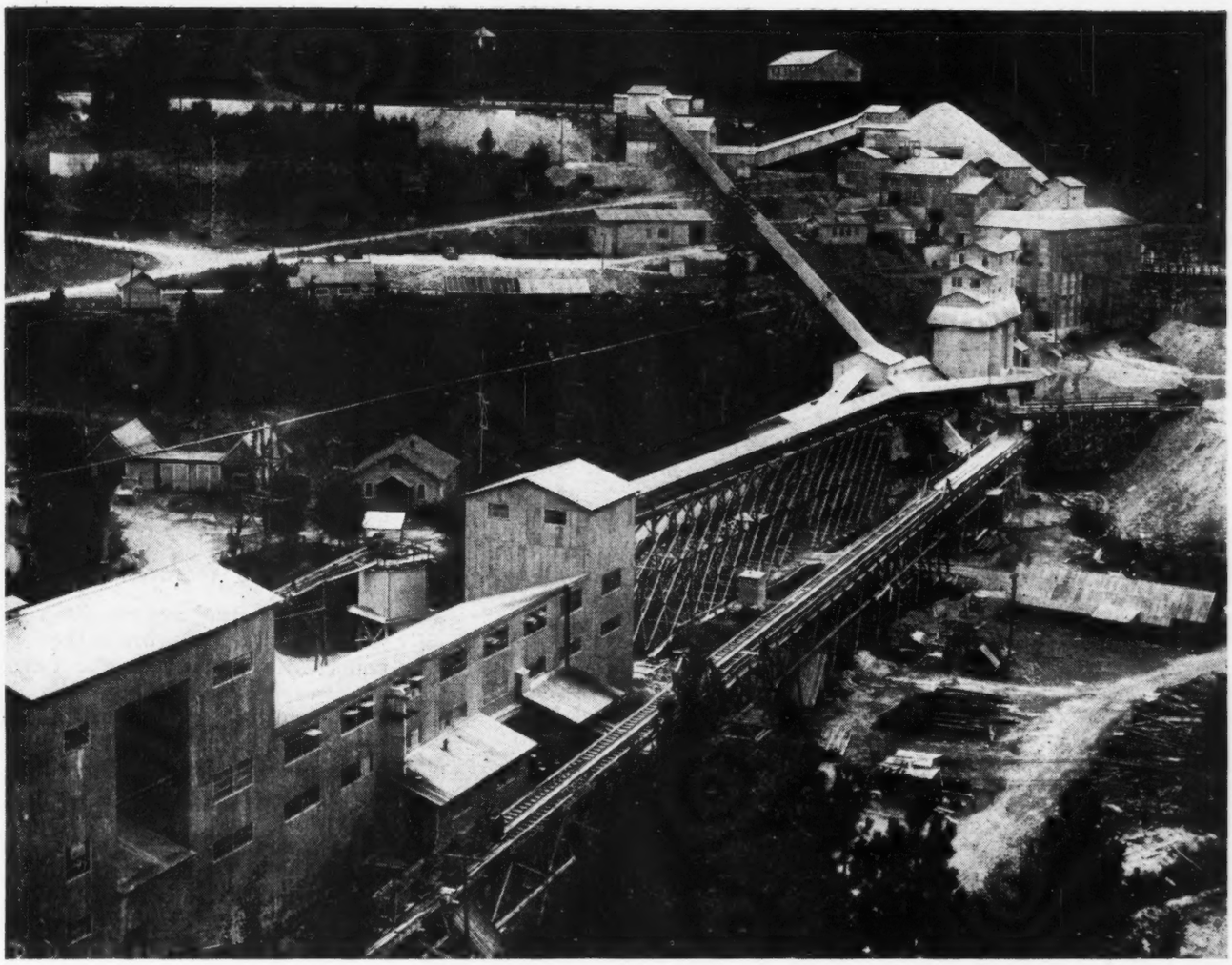


NORTHWEST'S KEYSTONE QUARRY was expanded from glory hole. Trucks dump onto grizzly at top of raise near center of pit. Ross feeder at bottom of raise loads conveyor to 20x24-in. jaw crusher. Crushed rock comes out, lower right, to tram leading bin.

# Northwest Magnesite Company



REDUCTION PLANT of Northwest Magnesite near Chewelah, Washington, where concentrates from mill (upper right) are burned to magnesium oxide.



CENTRAL MILLING PLANT will treat ore from four quarries. Trucks arrive from Finch at right. Trains from Allen pull in at top. Aerial trams from Keystone and Red Marble end at top also. Crushing plant, Heavy-Media mill are at right; flotation plant at left.

# — Unusual in Mine and Plant

JOHN B. HUTTL
Associate Editor

THERE IS AN UNUSUAL QUALITY in nearly every aspect of the operations of Northwest Magnesite Co. near Chewelah in Stevens County, Washington. The deposits of magnesite, the mining methods, the milling techniques, and the reduction plant, all in their separate ways, are noteworthy.

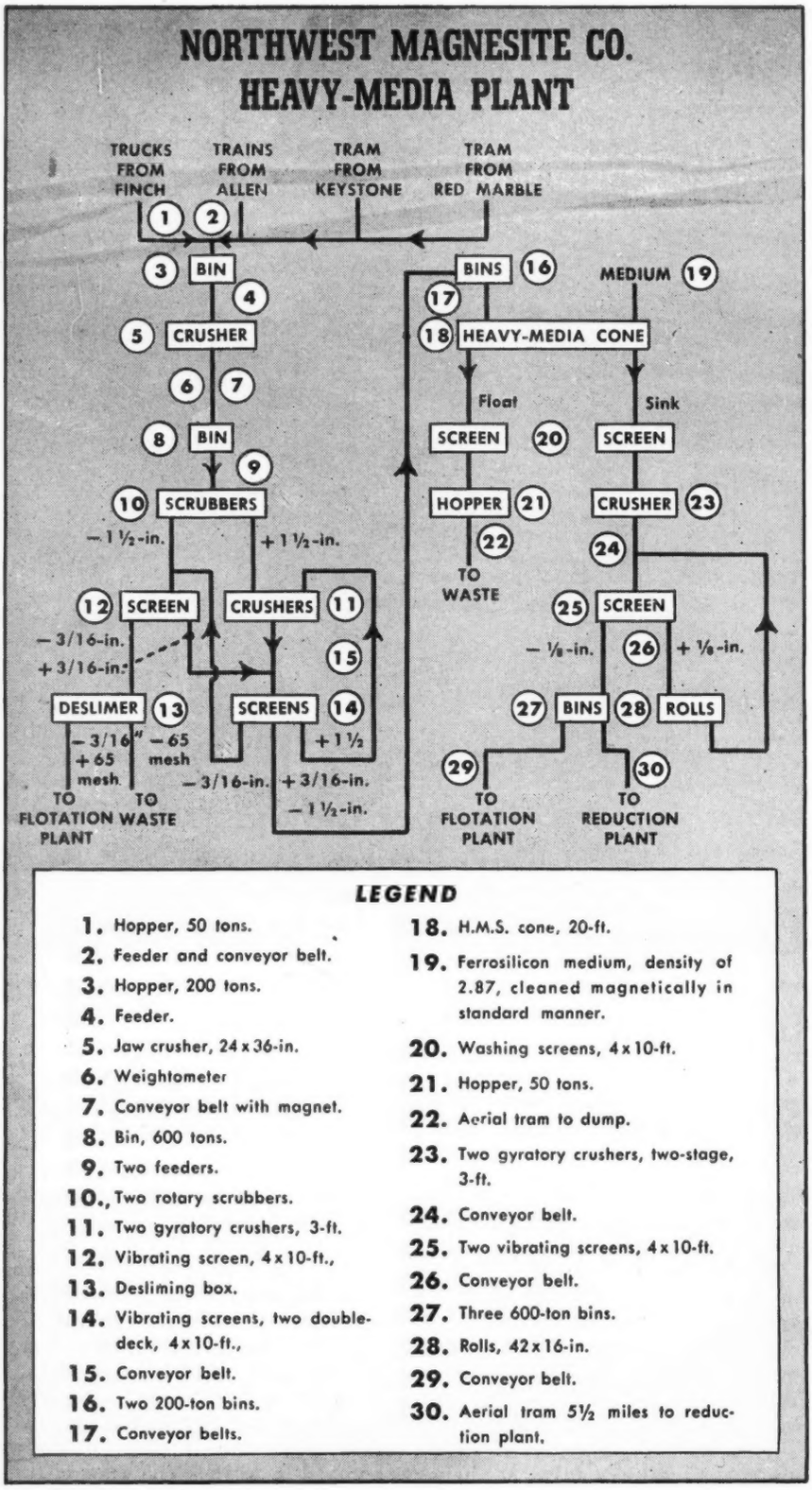
First worked by the company more than 30 years ago, the Chewelah deposits have grown in importance until today they are one of the principal sources of refractory magnesite in the United States. Austrian magnesite lost its U. S. market in 1914, when the First World War forced development of domestic sources in California and Washington. Since then, the Chewelah deposits have been a dependable source of magnesite.

These deposits, which filled so much of the last war's demands for refractory magnesite, lie about 60 miles north of Spokane. The Finch quarry, 6 miles west of Chewelah, was opened first in 1916. The nearby Allen-Moss property began producing in 1930, and the Keystone quarry, 5 miles southwest, began during the last war. The Red Marble quarry, near the Keystone, is now being developed.

From these quarries, rock goes to crushing plants, then to a Heavy-Media plant and a flotation mill set in a valley between the Finch and the Allen quarries. Mill products get final treatment in the reduction plant about 2 miles south of Chewelah.

The magnesite comes from a narrow dolomite formation that runs for 20 miles or so through southwestern Stevens County. Magnesite in the four quarries is crystalline, ranging in aspect from minute particles to coarse, granite-like crystals. Blocks of ore, which range in size up to several thousand tons, are uniformly colored, but color varies among the blocks, running from black up through blue-gray and red to white. The color change is caused by varying quantities of iron, manganese, and aluminum. There is a marked similarity between the Chewelah deposits and the Austrian orebodies whose place they have taken.

All quarries are now worked by the same basic method, which uses underground development followed by open pit mining. To begin with, vertical or inclined raises, called oreways, are driven up through the




**LEGEND**

1. Hopper, 50 tons.
2. Feeder and conveyor belt.
3. Hopper, 200 tons.
4. Feeder.
5. Jaw crusher, 24 x 36-in.
6. Weightometer
7. Conveyor belt with magnet.
8. Bin, 600 tons.
9. Two feeders.
10. Two rotary scrubbers.
11. Two gyratory crushers, 3-ft.
12. Vibrating screen, 4 x 10-ft.,
13. Desliming box.
14. Vibrating screens, two double-deck, 4 x 10-ft.,
15. Conveyor belt.
16. Two 200-ton bins.
17. Conveyor belts.
18. H.M.S. cone, 20-ft.
19. Ferrosilicon medium, density of 2.87, cleaned magnetically in standard manner.
20. Washing screens, 4 x 10-ft.
21. Hopper, 50 tons.
22. Aerial tram to dump.
23. Two gyratory crushers, two-stage, 3-ft.
24. Conveyor belt.
25. Two vibrating screens, 4 x 10-ft.
26. Conveyor belt.
27. Three 600-ton bins.
28. Rolls, 42 x 16-in.
29. Conveyor belt.
30. Aerial tram 5½ miles to reduction plant.

center of the orebody to be worked. The area round the tops of these raises is then worked out by glory-holing. Broken ore comes down the raise and out to a crushing station, as shown in the photograph of the Keystone quarry.

These glory holes are then converted into open pits with 30-ft. or 40-ft. benches. Wagon drills with 3-in. bits do the drilling; power shovels and trucks handle broken rock. Blast holes are usually spaced on 8-ft. centers.

Depending on fracturing and hardness of the ore, the holes are loaded with varying amounts of 2x12-in., 40% and 60% Gelex, up to within 4 ft. of the top of the hole. In wet ground, special 30% and 60% gelatin is used. Special ⅞x8-in. gelatin serves for secondary blasting of boulders left from the primary blasts.

Blasts are not standardized because each part of the orebody presents different problems. In the Allen pit, for example, bedding is quite flat and fractures are vertical, which calls for heavy blasts to displace the rock. At the Finch property, lighter blasting is possible because the bedding dips about 45 deg. toward the quarry face, and because the Finch ore is hard and brittle.

Recently a large experimental blast at the Keystone fired 1,000 holes, each 24 ft. deep on a 20-ft. bench. Holes were spaced on 4-ft. centers. Ground broke more uniformly and required less secondary blasting.

## Ore Transport

Each quarry uses a different method of moving its ore to the central treating plant near the Finch quarry.

At the Finch, ore is trucked to a receiving bin that feeds a long belt conveyor leading to the plant's storage bins.

The Allen ore goes down 250-ft. oreways and into trains of 64-cu. ft. cars. An electric locomotive hauls these trains through a 2,400-ft. tunnel out to the crushing plant.

Keystone practice is similar, except that ore is crushed at the mine and is brought over to the central plant by aerial tram.

Now in the development stage, the Red Marble property will use a 42-in. gyratory for primary crushing. An aerial tram will move ore to the central plant.

Power shovels and trucks now in use are to be replaced by new 2½-yd. shovels and 20-ton diesel trucks as part of a modernization program begun recently.

## Milling Techniques

The company uses both sink-and-float and flotation to prepare ore for the reduction plant. Data on the flotation process are not available. The Heavy-Media sink-and-float plant operates as shown in the accompanying flowsheet.

The Heavy-Media plant uses ferrosilicon medium, and makes the sink-float split at a density of 2.87. Careful control is required. Capacity of the sink-and-float plant is 1,000 tons per 8-hr. shift.

The flotation plant can treat about 100 tons per shift. Feed bins are arranged so that mine ore and reclaimed washer tailings can be

treated separately. Feed to the flotation machines is ground to 65% minus 100 mesh. Concentrate is thickened, filtered, and dried before it is shipped by aerial tram to the reduction plant.

## Burning Magnesite

The reduction plant at Chewelah takes the concentrated magnesite from the sink-and-float and the flotation plants and burns it at 2,900 deg. F. to produce magnesium oxide. The plant also has crushing, grinding, and screening equipment to prepare sized products according to customers' needs.

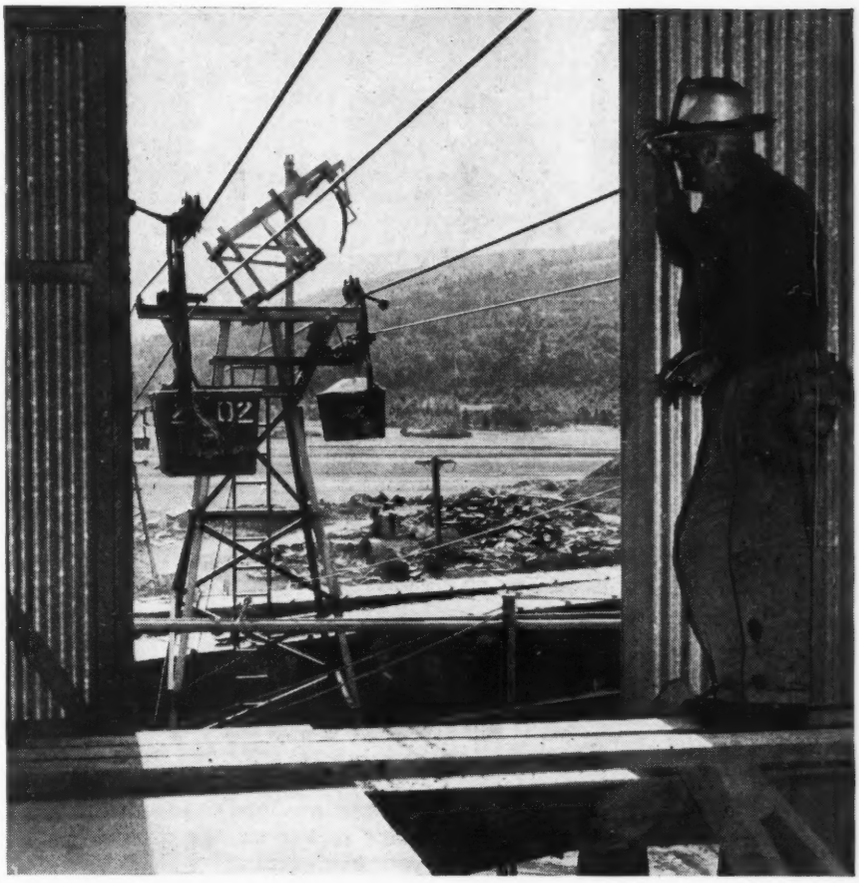
Seven rotary kilns are available. Six are Bonnot kilns, 7x125-ft.; and one is an F. L. Smidth Unax kiln, 9x307-ft. All are fired with powdered coal, and operation is automatic. A Cottrell plant catches the dust in the 600-deg. F. exhaust gases.

The flotation concentrates are burned without addition of other material, then cooled and stored. Some is then shipped to market in bulk in boxcars; some goes to the grinding and sizing plant first.

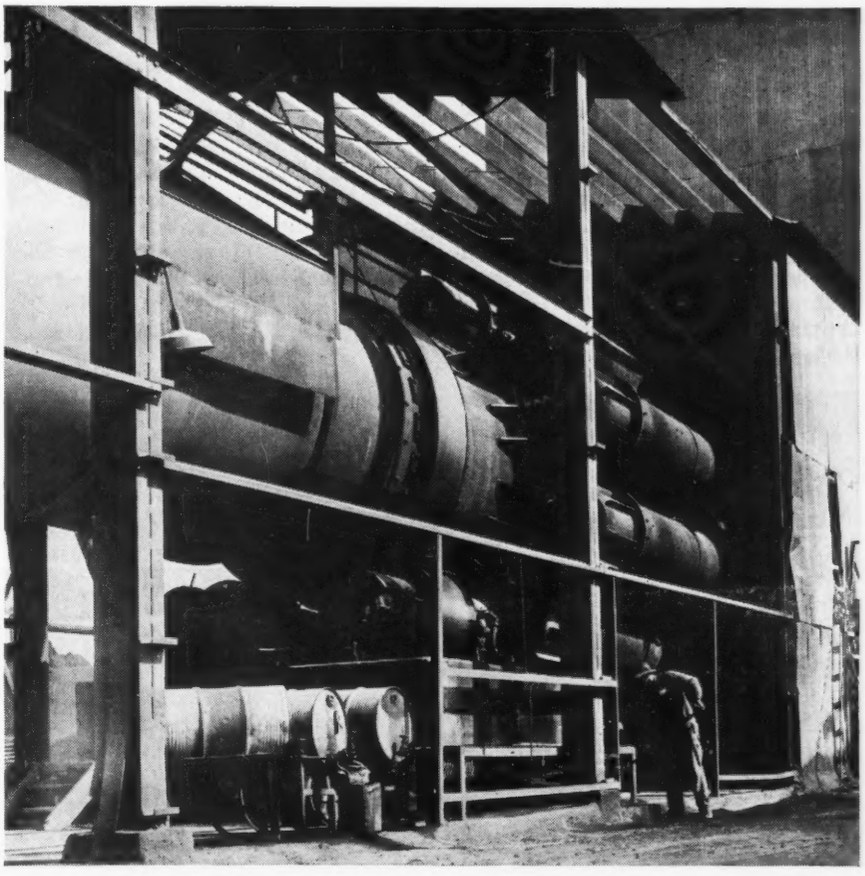
The rest of the reduction plant feed is mixed with a little iron oxide before being burned, the quantity of the oxide having been determined by the laboratory. Otherwise, its treatment is the same as for the flotation concentrate. Minus 65-mesh dust produced in various parts of the plant is caught in a Pangborn dust collector and sacked for shipment to market.

In the company's control laboratory, screen and chemical analyses follow closely all operations right from the diamond drills in the quarries to the dust collectors in the plants. These routines have been speeded up by using the flame photometer developed by the American Cyanamid Co. A calcium determination with the photometer is about 27 hours faster than the standard oxalate precipitation method.

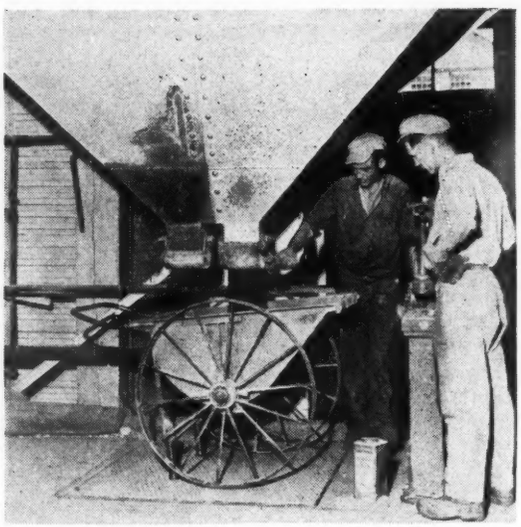
For permission to publish this article, *E. & M. J.* is indebted to Earl A. Garber, vice-president of Northwest Magnesite Co. The assistance of the following men in preparing the article is gratefully acknowledged: C. A. Sargent, manager at Chewelah; V. D. Gentis, reduction plant superintendent; H. A. Ziebell, general superintendent of mines; T. W. Morton, mill superintendent; Miles Standish, chief electrician; and Bonde Tuveson, chemist.

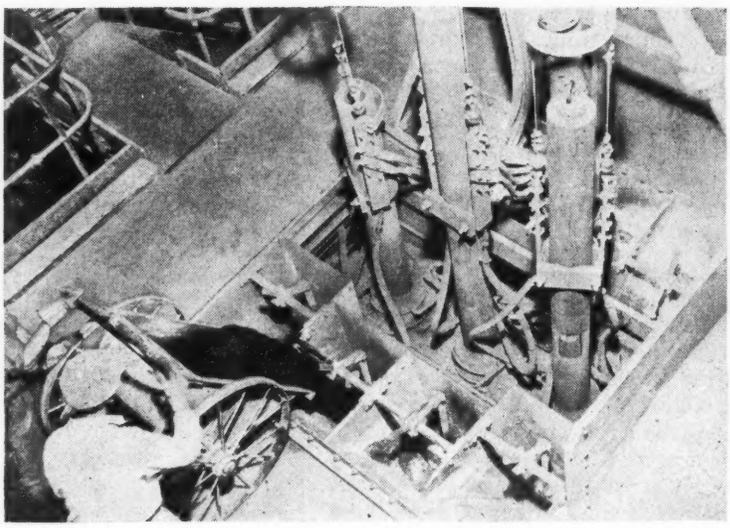


CONCENTRATE COMES to the Chewelah reduction plant on 5½-mile aerial tram, using 1,200-lb. buckets. V. D. Gentis, superintendent, watches.



MAGNESITE IS BURNED in seven rotary kilns, one of which is this Smidth 9x307-ft. model. The barrel-like structures around the main shell are calcine coolers.





**TIN CONCENTRATE AND COKE** are weighed (left) and charged into electric reduction furnace (right). Hourly charge to furnace consists of 800 lb. tin concentrate, 175 lb. roasted flue dust, 100 lb. liquated residue, 130 lb. coke, and 10 lb. limestone.

# Electric Furnace Smelts

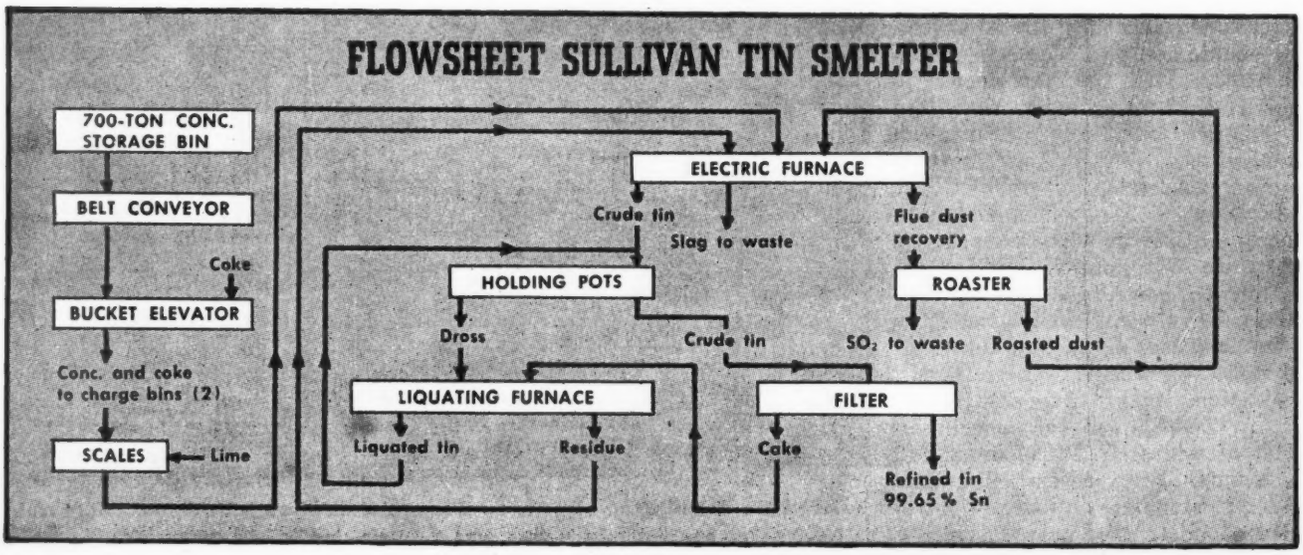

JOHN B. HUTTL
Associate Editor

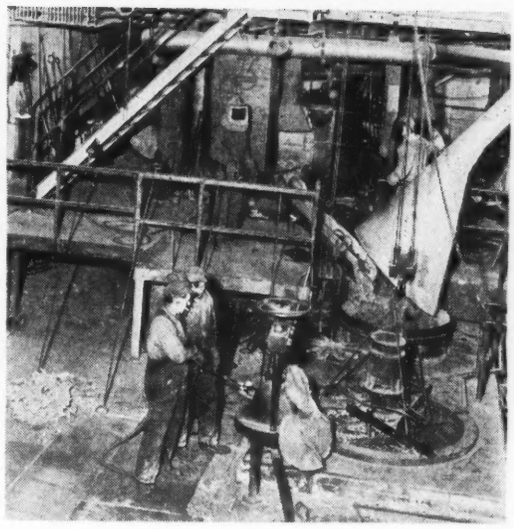

SUCCESSFUL SMELTING of tin concentrates at the Sullivan concentrator of Consolidated Mining and Smelting Company of Canada, Ltd., Chapman Camp, B. C., is the outgrowth of experimental work originally carried out at the Trail smelter, and subsequent improvements developed during actual furnace operations. Without resorting to electrolytic refining, a metal comparable to standard tin is produced in one operation by application of a lime-coke treatment of the concentrate.

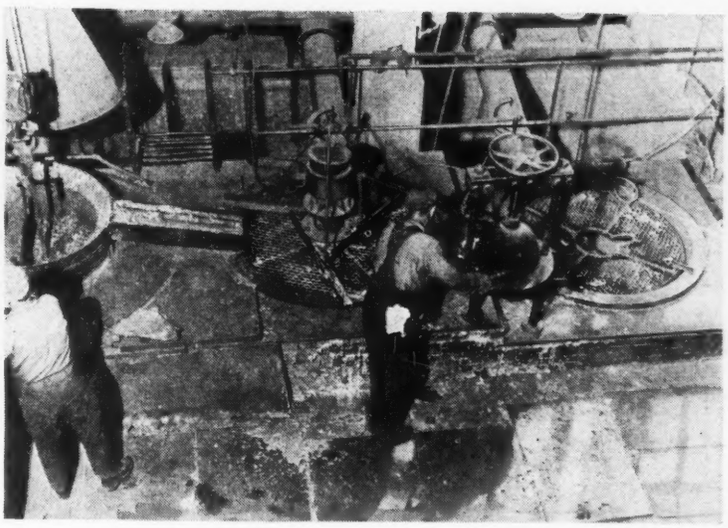
Concentrate for the Sullivan tin smelter are produced in the tin-plant section of the general Sullivan concentrator which was described in *E. & M. J.*, May 1946. Save for addition of extra flotation and concentrating equipment, current operations follow closely those described therein. Tailing from the zinc rougher circuit constitutes the plant feed, and treatment involves removal of the bulk of sulphides by flotation and subsequent gravity concentration of the gangue minerals, or tailing, to recover the tin. Heads assay 0.05% tin, and final concentrate 67% tin. Most of the tin carried in the Sullivan ore consists of small crystals of cassiterite of a maximum size of 75 microns (200 mesh). About 10% occurs as a sulphide. The cassiterite is about 85% free. Ratio of concentration is 2,800:1.

Tin plant concentrate is reduced to metallic tin in three steps: (1) smelting in an electric furnace, (2) refining the crude tin, and (3) dross treatment. As the lime-coke treatment of the concentrate makes possible production in one operation of a slag with a low tin content, no slag retreatment is necessary.

Concentrate is stored in a 700-ton bin equipped with eight 6-in. pipe chutes controlled by slide gates. Material is belt-conveyed from here to a bucket elevator discharging into one of two steel charge bins. The second bin holds the coke transported to it by the







AFTER TAP IS OPENED with oxygen lance, liquated tin runs into first holding pot. Temperature drops to 700 deg. F. Tin is drossed and pumped into second holding pot. Then it is pumped through filter into No. 3 holding pot. Filtrate is refined tin, 99.65% pure.

# Sullivan Tin Concentrate

bucket elevator mentioned. Capacity of the bins is large enough to hold the daily furnace charges, which are weighed into a hand buggy on scales on the floor below.

The reduction furnace is an oval-shaped 400-kva., three-phase electric unit. Its outside dimensions are 9 ft. by 6 ft. by 6 ft. high. Furnace lining consists of alumina-silica bricks, and the metal tap block is an electro-cast refractory furnished by the Corhart Refractories Co., Ltd. A water jacket encloses the lower portion of the furnace walls. Electric power is supplied at 90 volts, 3,000 amp. through three 8-in. graphite electrodes, and the power load is carried at 12% overload. No auxiliary reactance is required. The charge composed of 800 lb. tin concentrate, 175 lb. roasted flue dust, 100 lb. liquated residue, 130 lb. coke, and 10 lb. limestone is fed into the furnace through eight feed hoppers at the top of the furnace roof. The concentrate is reduced with minus-4-mesh breeze coke so as not to slow the smelting rate.

**TABLE I—Effect of Temperature on Tin Filtration**

| Filtrate Temp. deg. C. | % Iron in Feed | % Iron in Filtrate |
|---|---|---|
| 250 | 0.488 | 0.003 |
| 276 | 0.20 | 0.003 |
| 292 | 0.30 | 0.004 |
| 388 | 0.215 | 0.00494 |
| 397 | 0.45 | 0.00756 |
| 478 | 0.295 | 0.01208 |

**TABLE II—General Operating Data**

| | |
|---|---|
| Furnace rating | 400 kva. |
| Capacity per 24 hr. | |
| (a) Concentrates | 15,500 lb. |
| (b) Refined tin | 10,000 lb. |
| Electrodes per ton of refined tin | 12.6 lb. |
| Power per ton of refined tin | 1,860 kw.-hr. |
| Tin discarded in slag (as percent of tin treated) | 1 percent |
| Tin concentrates treated to date | 8,096,000 lb. |
| Metallic tin produced | 5,034,000 lb. |

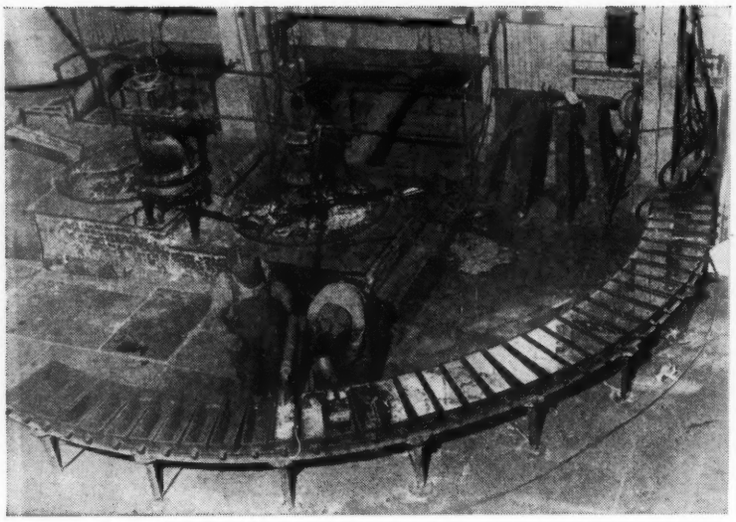
The current cycle of operation is about 30 to 33 hr. Thirteen charges are fed to the furnace, one each hour, before the first crude tin is tapped. Another tap is made after the twenty-second charge, following which an observation of level of the bath in the furnace is made through an inspection door on the side of the furnace. The complete charge is made up of from 27 to 31 charges. Reduction of tin continues until the slag assays less than 4.5 percent tin, which normally requires about 4 hr. When this point has been reached, the slag is tapped first and then the tin.

Slag tapped through a water-cooled, cast-iron slot flows down a brick-lined, cast-iron spout into a settling well, the overflow being granulated by passing it through a flat stream of water at 75 lb. pressure. Granulated slag is pumped to a storage pond by a 4-in. Wilfley sand pump. Crude tin leaving the furnace flows via a brick-lined launder into holding pot No. 1. Here the tin is held until its temperature drops to about 700 deg. F., when it is drossed and pumped to holding pot No. 2. After sufficient metal has accumulated in pot No. 2, it is pumped at as low a temperature as possible through a filter for additional refining. Filtrate of refined tin goes to holding pot No. 3. The cast-iron pots mentioned rest in brick settings heated by coal-fired furnaces.

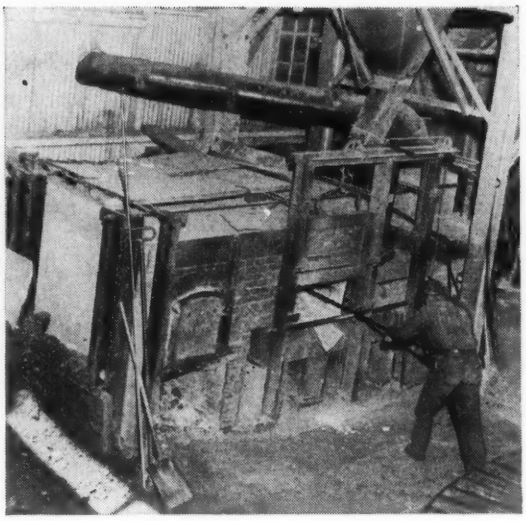
## Dust Recovery

The almost totally sealed furnace operates under a pressure of 0.20 to 0.40 in. water. Dust laden gas from the furnace enters a cylindrical dust chamber in which a temperature of 1,400 deg. F. prevails, and where a portion of the dust is dropped. From here, the gas passes through an 8-in. pipe fitted with sprays, eventually exhausting to the atmosphere at about 60 deg. F. Carbon monoxide is ignited and burned at the flue outlet. A typical gas analysis is as follows: Carbon monoxide, 70 to 90%; carbon dioxide, 30 to 10%; and oxygen, nil to trace. About 6% of the furnace charge is recovered as flue dust. The amount of flue dust in each dust chamber is controlled, within limits, by the temperatures maintained by water-spray cooling of the outside of the dry dust chamber, by the volume of spray water in the wet spray section, and by manipulation of the flue damper.

Dry dust is removed periodically from the dust chamber into containers, care being taken that no



FILTERED MOLTEN TIN is pumped from third holding pot into 36-mold, circular casting rack by centrifugal pump. Note bell-shaped filter between No. 2 and No. 3 pots where tin is filtered through asbestos.



FLUE DUST containing 13% sulphur is charged into a hand rabbling furnace to reduce sulphur to 2% or less before charging to electric furnace.

air enters the system while this work is in progress. Wet flue dust overflowing through a water seal into a pump sump is subsequently pumped through a Shriver filter press. Here it is dried to about 9% moisture by blowing air through the cake while it is in place in the press. Dust loss to the atmosphere per 15,000 lb. daily charge varies from 5 to 15 lb. The recovered flue dust is essentially a tin sulphide assaying 63% tin and 13% sulphur. To reduce the sulphur content to less than 5%, the wet and dry flue dusts are roasted on the hearth of a small reverberatory furnace. This unit is 4½ ft. square and 2 ft. 10 in. high. Daily output is about 1,000 lb. Roasted dust is returned to the reduction furnace.

## Refining Crude Tin

The Trail method of refining tin is based on the law of iron solubility in tin. According to these data, iron is quite soluble in tin at high temperatures, but on lowering the temperature to a point near the melting point of tin, the iron separates as a solid component $FeSn_2$ (containing about 19% iron) suspended in virtually iron-free tin. By application of a filtering process the solid $FeSn_2$ is separated from the liquid tin, and the iron content of the crude tin lowered to 0.005%.

The patented tin filter, developed by Consolidated and in use at the Sullivan tin smelter, is an all-steel, single-compartment pressure filter. It consists of a bell-shaped pressure chamber with connections to a centrifugal pump and compressed air; perforated steel plate covered with asbestos cloth; and a conical filtrate basin from which the filtered tin is discharged into a casting pot. Close control of the filtering temperature is an essential feature of the operation. Although normal crude tin contains from 0.2 to 0.8% iron, bullion containing 6% iron has been successfully filtered. Filter cake assays about 80% tin and 9.5% iron, and is liquated with the dross. Effect of temperature on tin filtration is given in Table 1.

An analysis of refined tin is as follows: iron, 0.005%; lead, 0.31%; copper, 0.003%; zinc, 0.005%; bismuth, 0.002%; aluminum, 0.005%; manganese, 0.005%; cobalt, 0.004%; antimony, 0.01%; and tin, 99.65% (by difference). The lead content cannot be reduced without electrolytic refining or by elimination in the concentration operation. Refined metal is pumped into the 36 molds carried on a circular casting rack. Each bar is skimmed to a clean surface, the weight being 104 to 106 lb.

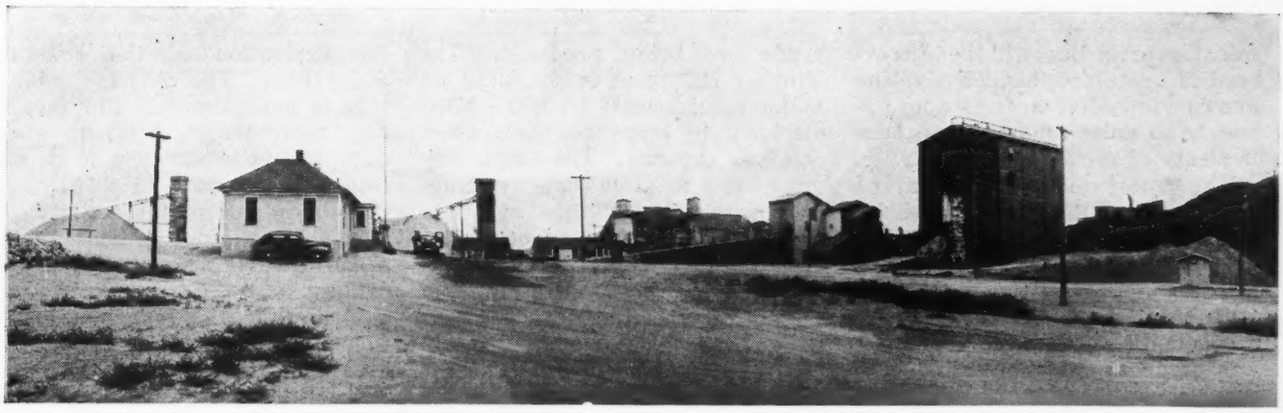
## Dross Treatment

Dross removed from the holding pots by perforated skimmers is transported to a coal-fired reverberatory furnace with a liquating chamber 5½ ft. long, 4½ ft. wide, and 2 ft. high, inside dimensions. The bottom of the chamber slopes 1 in. per ft. towards the discharge spout through which liquated tin discharges into a cast-iron kettle. Residue is raked out manually. All dross is liquated in order that the metallic tin contained may be recovered with minimum delay. The liquated tin is mixed with crude tin and refined by filtering. Residue is returned to the reduction furnace. It amounts to about 12% of the concentrate treated. Experience has shown that the treatment given the liquated residue is important to subsequent electric furnace operation. Before it is charged to the furnace, the liquated residue is well oxidized and broken to minus-1-in. size.

## Slag Not Treated

Because the lime-coke treatment of the concentrate permits production of a low-tin slag in one operation, no slag treatment operation is necessary. An arbitrary upper limit of 4% has been set. The slag is of bisilicate degree, and following is a typical analysis: tin, 3.5%; iron, 16%; sulphur, 0.4%; alumina, 22.1%; lime, 9.3%; lead, trace; silica, 22%; manganese, 6.4%; tungstic oxide, 8%; magnesium oxide, 1%; and titanium dioxide, 11%. General operating data covering the entire plant are given in Table 2.

To R. W. Diamond, vice president and general manager, The Consolidated Mining and Smelting Company of Canada, Ltd., Trail, B. C., Canada, thanks are due for his permission to publish this article, and grateful acknowledgment is made to H. R. Banks, superintendent, Sullivan concentrator, Chapman Camp, B. C., and his staff for their help in the preparation of this article and the courtesies extended during my recent visit to the plant.



PANORAMA OF VINEGAR HILL PLANT AT CUBA CITY. Extreme left, toe of MRC stockpile; left, office and mill tailings piles; center, gravity-flotation mill; right, acid plant and ferruginous residue dump.

# New Finds Revive Old Galena-Platteville Area

THE GALENA-PLATTEVILLE district, famous as a lead producer since before the Civil War and as a zinc producer since the sixties, is experiencing an interesting revival. New mine discoveries have stimulated leasing and exploration campaigns by several companies, and it seems likely that a number of new mines may be discovered.

For many years prior to the war the district's production had been gradually declining. In 1938 less than 5,000 concentrate tons were shipped, none from the Illinois portion of the area. The war demands and the Premium Price Plan brought about new activity, both in reopened old mines and in tailings retreatment, but it was definitely of a marginal type.

The wartime development program of the U. S. Bureau of Mines initiated the district's rejuvenation. As part of its program, the Bureau drilled along the strike of the orebody of the old Black Jack mine of The New Jersey Zinc Co. on the Gray land, leased by Wm. B. Baggaley and associates, near Galena. This drilling resulted in the discovery of a new orebody which, although rather small, was sufficient to induce Tri-State Zinc, Inc., to undertake development and operation of the property. A 6x12 shaft was sunk to a 200 ft. depth and a 600-ton jig, table and flotation mill was erected. Production began in late 1944.

Since that time the company, with assistance from the Bureau of Mines, has drilled out another larger orebody on the adjoining Bautsch land, continuing the same southeast trend. Another shaft has been sunk on this property and production began in late 1946. The ore is trucked to the Gray mill.

In 1946 the Eagle-Picher Mining and Smelting Co. began an exploration campaign in the district which still continues. Eagle-Picher has already drilled out one orebody on the Graham land, six miles north of Galena, and is sinking a shaft on the property.

In addition to Tri-State Zinc and Eagle Picher, these discoveries have stimulated interest in the area by several large companies. The American Metal Co., St. Joseph Lead Co., and Calumet and Hecla Exploration Co. all have exploration and leasing programs under way. It seems likely that several more

PROPERTY OF TRI-STATE ZINC, INC., NEAR GALENA. Left, tailings pile; center, Gray shaft and mill; right, office and Bautsch shaft.

minable orebodies will be discovered as a result of this activity. The known productive area is approximately 60 miles square; thus there is plenty of room for new finds.

The flotation and acid plant of the Vinegar Hill Zinc Co. at Cuba City provides the outlet for the gravity concentrates produced in this area. During the period the Premium Price Plan was in effect, a substantial tonnage of crude ore was produced, which resulted in a surplus considerably in excess of the capacity of the Vinegar Hill mill. This crude ore was stockpiled for the account of Metals Reserve Co.

Since the expiration of the Premium Price Plan, there is very little crude ore being produced. The Vinegar Hill plant is obtaining its major requirements from the MRC stockpile to keep the plant operating at capacity. The Cuba City plant has a monthly capacity of approximately 15,000 tons of crude ore, which results in an output of 1400 to 1500 tons of zinc concentrates, depending on the metallic content of the mill feed. The concentrates average approximately 61% to 62% zinc. The lead concentrates produced amount to 75 to 80 tons per month.

Operations at Dodgeville consist of the flotation plant of the Dodgeville Mining Co. Having a substantial amount of lead, this company has continued operations in spite of the expiration of the Premium Price Plan. The monthly production is approximately 275 tons of zinc concentrates, assaying about 62%, and approximately 45 tons of lead concentrates. In addition to its mining and milling activity, the Dodgeville Mining Co. is also doing a considerable amount of prospect drilling.

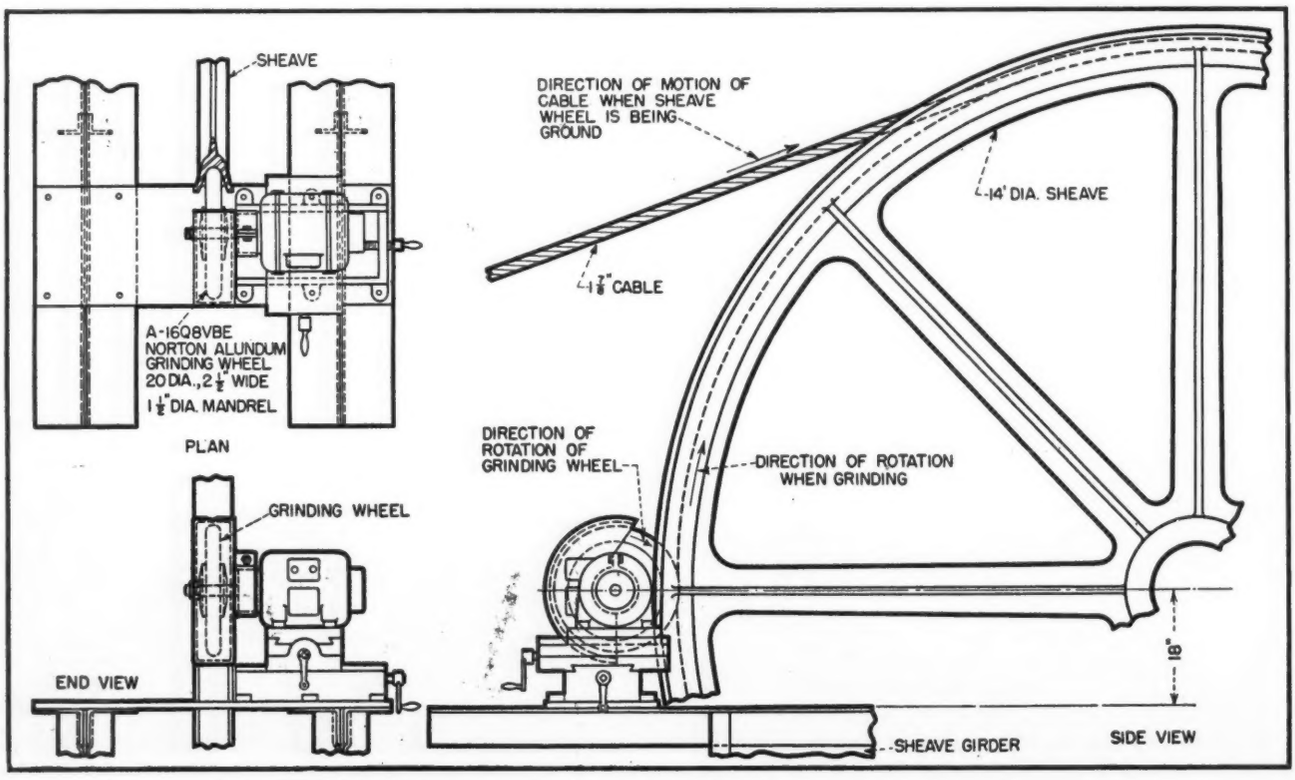
Meanwhile the marginal operations, which renewed activity in the area with the aid of the Premium Price Plan, have suffered severely since premiums were discontinued. Tailings retreatment has ceased entirely and only a few mining operations survive, mainly by virtue of producing more than an average proportion of lead.

# Headsheave Maintenance Saves Wear on Ropes

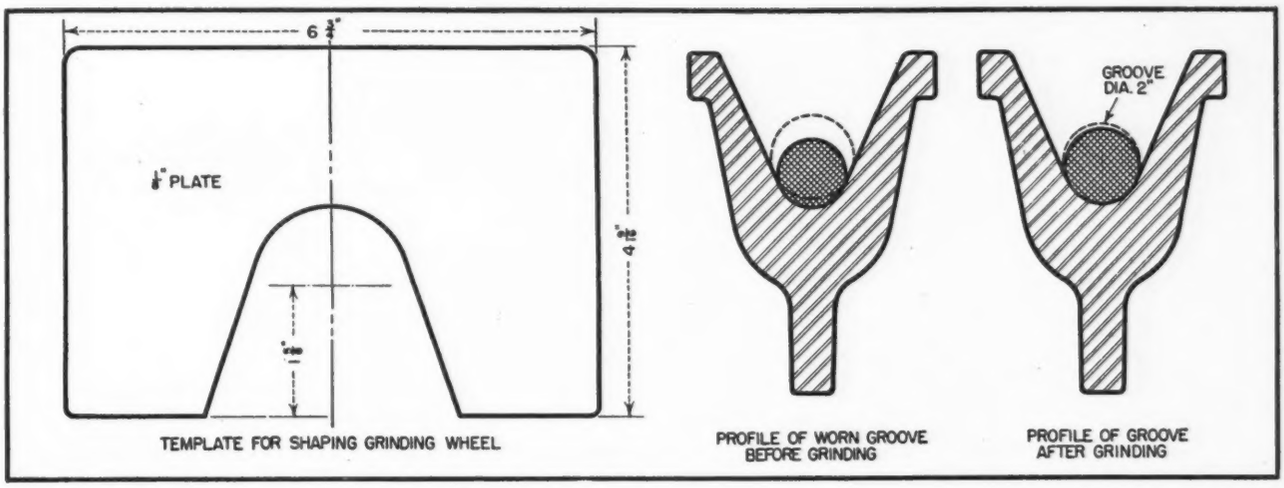
**By The Mechanical Department**
Homestake Mining Co.
Lead, S. D.

THE MAINTENANCE of correct size and contour of headsheave rope grooves is a contributing factor to the life and service of all steel hoisting ropes. This is more marked on the larger and deeper mine shaft installations where large diameters and greater lengths of hoisting ropes are required, and where any undue or preventable wear of the hoisting rope reduces the rope diameter below the safe operating load more rapidly, requiring premature removal and replacement.

The Homestake Mining Co. has in operation five large hoisting units: Ellison ore hoist, rope diame-




SHEAVE GRINDING ARRANGEMENT for 14-ft. dia. sheave at Yates shaft of Homestake mine.




ter 1½ in., headsheave diameter 12 ft., manganese steel rim; Ross cage hoist, rope diameter 1⅝ in., headsheave diameter 12 ft., cast steel; Ross ore hoist, Yates cage hoist and Yates ore hoist, rope diameter 1⅞ in., headsheave diameter 14 ft., cast steel. Regular inspection and checking with contour gage of the headsheave rope groove is made every thirty days and any unusual conditions or developments are carefully watched and studied.

## Why Regrooving Is Needed

All headsheaves are finished by the manufacturer with proper size and contour of rope groove for a given size of new hoisting rope. As the original diameter of the 1⅞-in. dia. rope is a plus 1/64 in. to 1/32 in., a maximum of 2 in. is the allowable groove seat. The new rope in service will stretch and set itself to the approximate 1⅞ in. dia. Throughout its service the contact of rope with headsheave groove gradually reduces the rope and groove diameters. This may in no way interfere with the normal operation of this particular rope, but the rope groove will be unsuitable for the following new rope until it is trimmed to the required standard diameter.

In 1927 at the Ellison ore hoist it was necessary to replace the hoisting ropes, and the grooves of the headsheaves required trimming for the new ropes. As the sheaves could not be conveniently taken down, it was decided to construct a portable rig or machine, to be installed at the headframe, and to grind the grooves to standard size with the headsheave and rope in place. This application and operation was entirely successful and has since been used on all of the large installations, whenever ropes were turned end for end or when new ropes were installed.

The design of the grinding rig is as follows: A substantial base and slide comparable to a lathe carriage with longitudinal and cross feed, capable of holding an electric motor that directly drives a 20-in. x 2½-in. Alundum grinding wheel at a speed of 1,150 rpm. with a minimum of vibration. This base is bolted to a 1-in. steel plate which rests on a structural extension of the main sheave girders. The motor is 7½ hp., dustproof, ball-bearing type with Arktite plug and cable, which is plugged into an Arktite wall receptacle near the sheaves. A start and stop push-button switch is mounted on the motor for convenience and safety. See illustration for mounting, and position of operation with relation to the sheave and rope. The 20 x 2½-in. grinding wheel is dressed to the desired contour with a regular grinding wheel dresser. See illustration of contour template of grinding wheel.

## Hoist Rotates Sheave

The headsheave is rotated or driven by the hoisting engine by means of the hoisting rope in normal position, running in the sheave groove with an approximate speed of 50 ft. per min. This speed has been determined best for a 14-ft. diameter sheave; other sizes will vary accordingly. The old rope that is to be removed is used for this purpose.

For proper contact and efficient grinding, the grinding wheel is applied into the rope groove only when the hoisting rope (with the skip or cage attached) is descending the mine shaft, and is withdrawn from contact when the rope is ascending. This also permits all grinding chips to be thrown down and away from the rope and sheave wheel, and prevents them from becoming imbedded in the rope. It is not necessary to clean the surface of the groove after the passing of the grinding wheel.

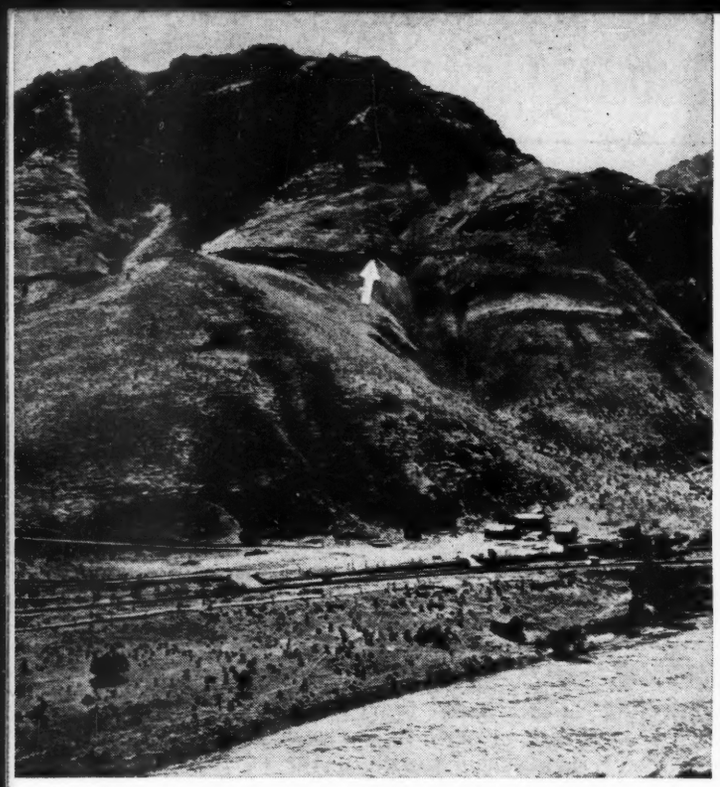
Before starting grinding operation, the rope groove is thoroughly cleaned of all heavy rope lubricant, and in the grinding operation such lubricant as is deposited in the rope groove by the rope movement is immediately swabbed clean before moving into the grinding contact. A non-inflammable cleaning fluid is used.

## Groove Contour Checked

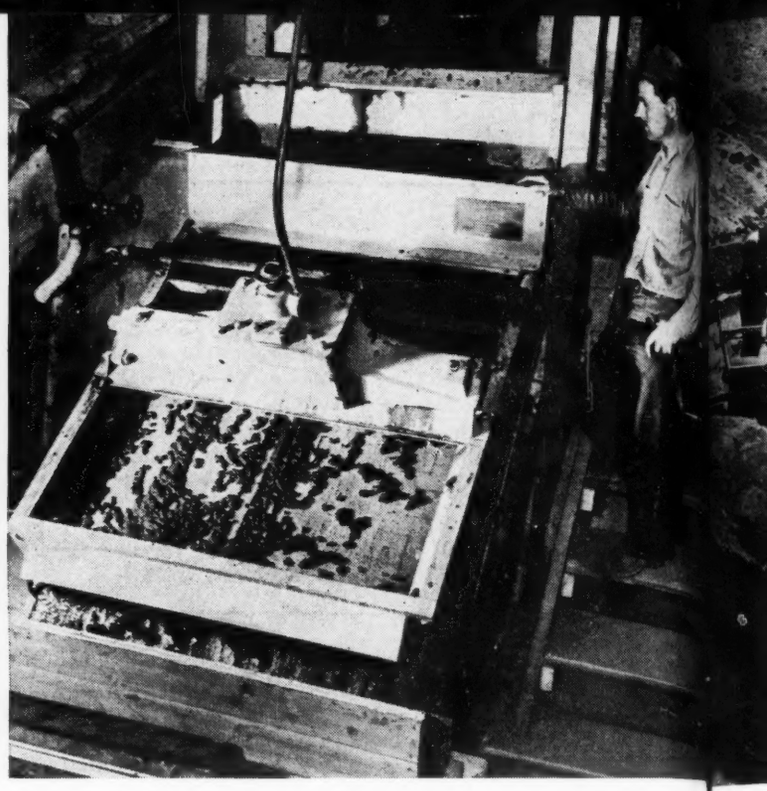
The rope groove size and contour are checked with a steel circular disk which is 2 in. in dia. maximum for 1⅞-in. dia. rope. This conforms with the standard practice as recommended by leading rope manufacturers. Dimensions of the rope groove contour are illustrated, and the finished groove conforms very closely to the given recommended standard.

In order not to delay or interfere with the regular operation of the hoisting units this work is done on Sundays or holidays. The average required time for trimming two 14-ft. sheaves for 1⅞-in. rope is 8 to 10 hr., depending on amount of material which has to be removed from the sides of the groove of the sheave.

Normally four men are employed on this operation, two on the grinding and two on the cleaning job. It is a very tedious and steady job. At all times while the rope and sheave are in motion one of the men stands by the signal system so that the hoisting engine can be stopped immediately in case of accident or trouble.



PERLITE IS MINED at Lady Frances mine, situated above Frieda Station on west bank of the Deschutes River, near Maupin, Ore.



ORE IS MILLED in 30-ton pilot plant. John Dwyer, mine foreman, inspects vibrating screen in closed circuit with rod mill.

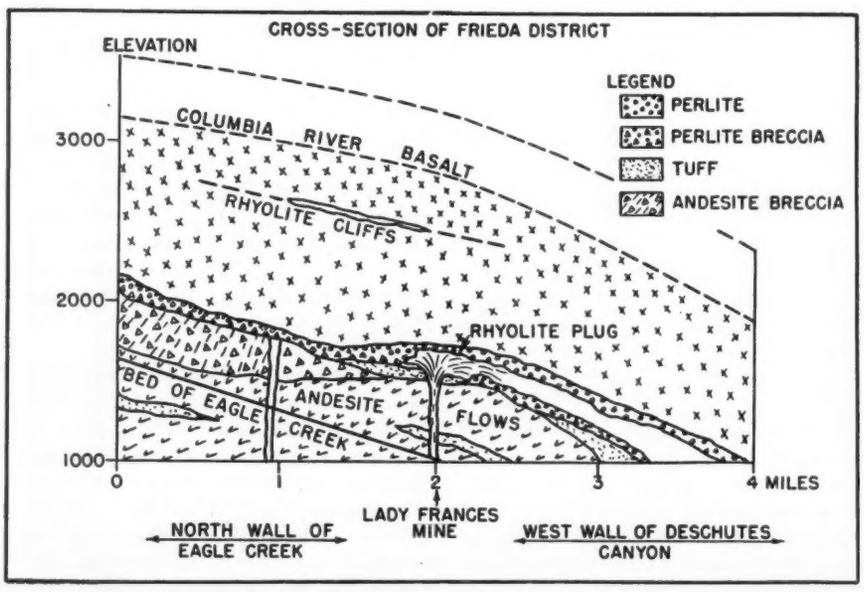
# The Lady Frances Mine—

PERLITE is a glassy volcanic rock similar to volcanic glass or obsidian but differing from it chemically by containing from 2 to 4% water. When heated to 1,700 deg. F., the water vaporizes, decrepitating the perlite with large volumetric expansion, thereby producing a white, frothy, light-weight aggregate. Expanded particles or "popped" material range in size from about ⅛ in. down to powder. When viewed under a microscope, they have an opalescent luster from which the name perlite was probably derived. Research on the material since the end of World War II resulted in its expanding use for plaster, concrete aggregate, wallboard, and other insulating, acoustical, and building materials. This has stimulated search for and development of perlite deposits in the West.

Material favorable for the manufacture of perlite is generally found in areas of late volcanic disturbance, frequently showing evidence of hot spring activity. Occurrences of commercial perlite have been reported from Arizona, California, Nevada, and Oregon. The deposits under development in central Oregon are of interest because a marketable product is now being produced at one property, the Lady Frances mine, which is operated by Dant and Russell, Inc., of Portland, Ore. The material produced is marketed as "Dantore."

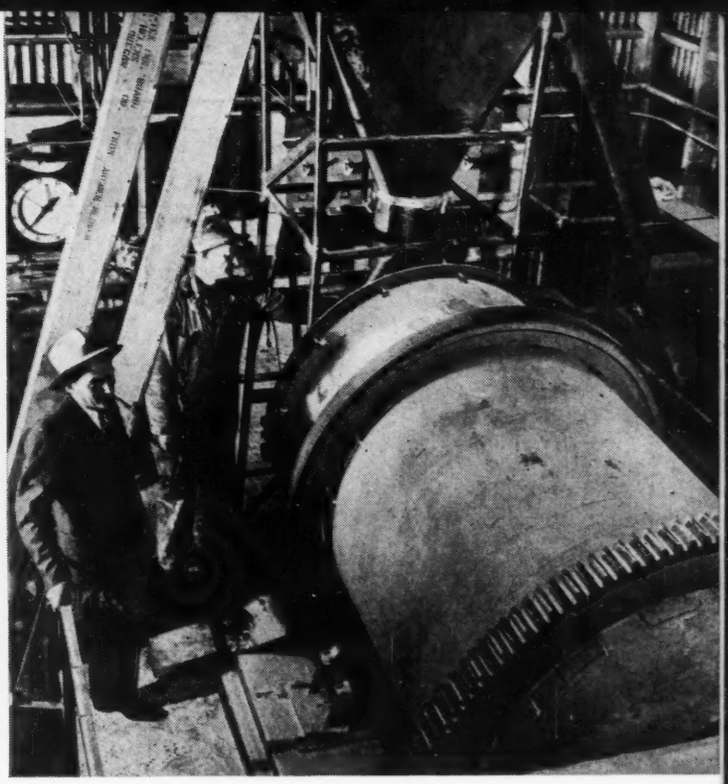
The deposit lies in the south-central part of Wasco County on the west side of the Deschutes River, about 9 miles south of the town of Maupin. The mine portal is 1,400 ft. west of the Oregon Trunk R. R., and 1,500 ft. north of Frieda Station at an elevation of about 1,550 ft. and 500 ft. above river level.

Presence of perlite rock in the Frieda area was definitely established in 1919 when J. M. Axford submitted samples from the deposit to the Oregon Bureau of Mines. Little or no activity occurred until early 1945, when engineers for




GEOLOGIC SECTION of Frieda district showing perlite deposit.

PERLITE ORE IS SACKED and shipped to company's expanding plant at St. Helens, after being ground and sized at mill.



ROTARY KILN at expanding plant "pops" 16 tons of perlite per seven-hour shift. Product weighs less than 12 lb. per cu. ft.

# A New Source of Perlite

Dant and Russell, Inc., 1108 U. S. National Bank Bldg., Portland, Ore., following consultation with the Bureau, entered the area and located the Lady Frances deposit. Prospecting and development work was started late in the fall of that year. Recently, a second perlite deposit has been found in the district. It lies about two miles east of the Lady Frances mine, on the north bank of Deschutes River, and is owned by J. M. Axford and C. N. Hunt.

The geology and mode of occurrence of the Wasco County perlite deposits has been described by John Eliot Allen, geologist, State of Oregon, Department of Geology and Mineral Industries.* The Lady Frances perlite deposit under exploitation and others found in the Frieda district occur within the Clarno formation, of Eocene (lower Tertiary) age. It is a series of andesitic, basaltic and rhyolitic lavas with interbedded tuffs and ash. Near the mine the formations lie fairly flat, with the regional dip to the north, and the perlite flow at an elevation of 500 ft. above the river dips below river level less than two miles north. The perlite mined varies from light gray to nearly black in color, and has a blocky to splintery fracture. At the mine portal the perlite is about 150 ft. thick, but 400 ft. south it is less than 30 ft. thick, being replaced by bedded tuffs below and vitric tuffs above. North of the mine portal, a plug of rhyolite 400x800 ft. is surrounded on three sides by perlite, and contains vertical, contorted, and steeply dipping flow planes. The contact between the plug and the adjacent perlite consists of interfingering lenses of perlite in rhyolite and rhyolite in perlite, the latter being parallel with flow planes in the perlite. Additional geologic features of the district are shown in the accompanying section prepared from maps by Allen.

Since opening of the mine in 1945, more than 2,000 ft. of development drifts and cross-cuts have been driven, and several open cuts in perlite established. Future mining will be by open pit methods. Mined ore is treated in a 30-ton pilot mill below the mine containing a 6x8-in. Dodge crusher, 2x6-ft. Marcy rod mill, one Hum-mer screen, Western hydroseparator with Massco-Adams density control, settling and dewatering tanks, and pay loader to railroad car. Here, the perlite ore is crushed to minus 1-in. by the jaw crusher and ground to 20 mesh in the rod mill operating in closed circuit with the vibrating screen. To insure a clean product and successful treatment at the expanding plant at St. Helens, Oregon, to which the mill product is shipped, all fines smaller than 200 mesh are removed by the hydroseparator. Treatment at the St. Helens plant involves expanding or "popping" the perlite in a 4x8-ft. specially designed rotary kiln (patent applied for), and fired by four butane gas burners to temperatures ranging from 1,500 to 2,500 deg. F. The kiln rotates at 8 r.p.m., and is fed from a 3x4-ft. storage cone which is served by a small bucket elevator.

The expanded perlite weighing less than 12 lb. per cu. ft., as compared with sand's weight of 85 lb. per cu. ft., can be used as lightweight aggregate for plaster or concrete, and has a number of other uses where light weight and insulating and acoustic properties are of value. Current output of the pilot plant is 16 tons of expanded perlite per 7-hr. shift.

*John Eliot Allen, geologist, State of Oregon, Department of Geology and Mineral Industries. GMI Short Paper No. 16, "Perlite Deposits near the Deschutes River, Southern Wasco County, Oregon."

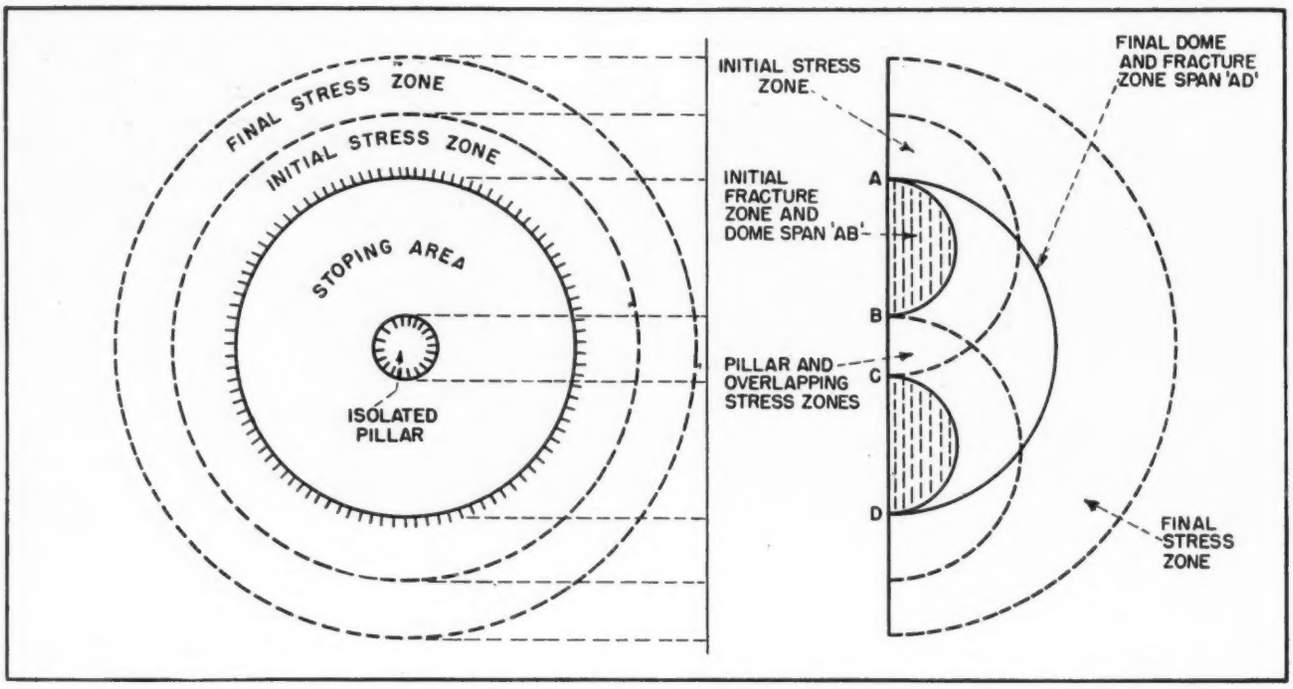



FIG. 3. DIAGRAM illustrates theoretical conditions presumed to be associated with an isolated pillar in a circular stoping area.

# A General Theory of Rock Bursts—Part 2

**Outlined in the preceding installment, it rests largely on (1) the energy likely to be associated with a burst; (2) the elastic behavior of rocks in the low-pressure range; and (3) the characteristics of the resulting dome and fracture zone. Some situations associated with bursts are first discussed.**

WITH THESE POSSIBILITIES at our disposal, together with the fact that rocks are subject to internal strain quite independent of depth, we can now consider the various situations associated with rock bursts. These are:

1. Development openings.
2. Uncomplicated stoping (the ideal stope).
3. The plane of weakness.
4. The isolated pillar.
5. Multiple openings.

**1. Development openings.** Bursting here is usually associated with a particular type of rock or weakness and is invariably of a local nature.

Considering the total development of footage of a mine, the proportion which bursts to an arched shape as compared to the proportion which develops the arch by a gradual process is very small.

Some bursts of this nature certainly suggest the presence of an inherent strain in the rock which is quite independent of depth. This may be due to previous geological conditions or to the proximity of faults where regional strains are still active. In some mines a bursting tendency of this type follows definite zones usually related to faulting. Such bursts are frequently associated with blasting, but in large shafts they have been known to follow the resumption of drilling after mucking out.

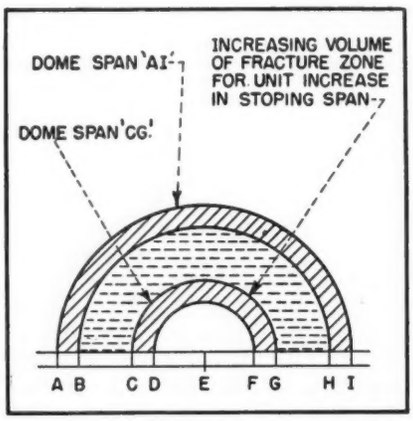



FIG. 4. WITH HEMISPHERICAL DOMES the relationship for the fracture zone is that of area to spherical volume.

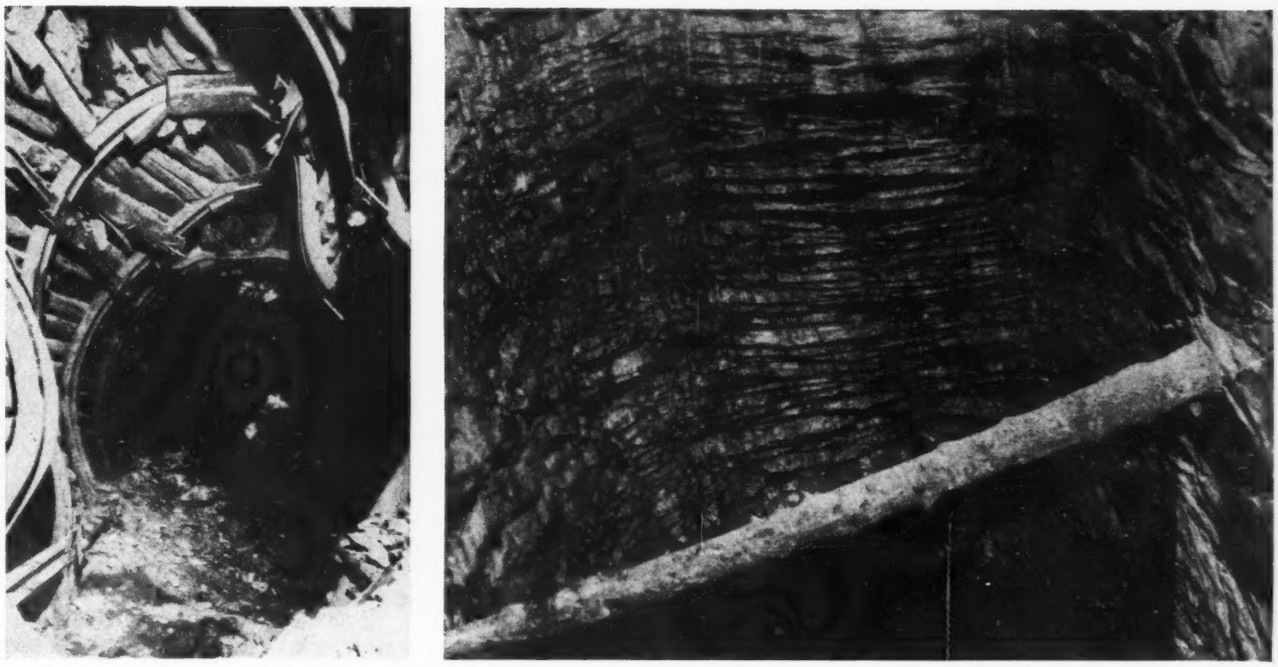
Aside from the above possibilities, having regard to the variations in even similar rocks, with the slow recovery from strain, resulting in the elastic contraction of the opening and the building up of the stress zone, it is not difficult to visualize occasional combinations of conditions which result in the sudden, rather than the gradual, development of the arch.

**2. Uncomplicated stoping (the ideal stope).** Here again, except in close proximity to development openings, a single stress zone only is involved, and a rock burst is usually confined to a portion of a single stope face.

Such a rock burst can be attributed to inherent strains but is more likely due to an unpredictable combination of conditions which have held up or obstructed the normal doming process. Even theory offers no absolute solution.

**3. The plane of weakness.** Any pronounced line of weakness of necessity influences the stress pattern surrounding an opening, and in so doing is an additional factor controlling dome development and the associated fracture zone.

When the weakness passes through a small opening, such as a drift or crosscut, at certain angles the tendency is for it to form the apex of any arching. In



EFFECTS of moderate rock burst on steel-supported level at 2180-ft. vertical depth. Right, SHEAR PLANES in quartz back.

the larger stoping domes not open to inspection, it is reasonable to assume a similar condition, which can be arrived at gradually or suddenly, depending on whether stoping, as regards the weakness, is started in a manner permitting the gradual development of such a dome.

A weakness paralleling an opening, such as a drift, will within certain distances cause gradual, if not sudden, failure. The inference is that, further within the walls beyond inspection, a pronounced plane of weakness outside a stoping dome will, within a certain critical distance, influence the further development of that dome.

**4. The isolated pillar.** Fig. 3 illustrates the conditions presumed to be associated with an isolated pillar in a circular stoping area, and while in section the effects in one wall only are shown, both walls will react similarly except insofar as gravity acts with the fracture zone in the hanging, but against it in the footwall.

The fracture zones within the domes over each stoping section are shown, but it will be noted as regards the pillar that we are no longer dealing with the effects of a single stress zone, as it forms common ground for a concentration of superimposed stress zones.

So long as the pillar can withstand the complicated stresses involved in resisting the merging of the two independent domes into a single dome over the whole circular area, stability remains. However, at some stage in the reduction of the pillar, stability demands the formation of a single dome and, due to movement within the elastic limit, it is highly probable that doming stresses are developing in the solid in anticipation of this result long before the pillar actually fails.

Many pillars are removed with no serious bursting, due to a gradual development of the final dome, perhaps with failure such as slippage along joint planes or other weaknesses. Against this possibility, however, it is my impression that the isolated pillar, either singly or collectively, has been an important cause of rock bursts.

If the pillar fails suddenly, and it may do so within the walls, leaving the lode portion comparatively solid, a large volume of rock is added to the fracture zone of a final dome. The strain energy released from this additional volume of rock (foot and hanging) thus suddenly transferred from the confined to the free state represents the energy precipitating the rock burst.

The failure is inward toward the stopes and is cushioned by the fracture zones already developed. In this connection, it is interesting to note that the records of Kirkland Lake rock bursts obtained at the Dominion Observatory, Ottawa, indicate that the first impulse is invariably transmitted as a rarefaction, that is, towards the origin of the burst.[5]

**5. Multiple openings.** The stress pattern here in plan is similar to the isolated pillar, insofar as with the enlargement of two or more openings toward each other the intervening ground eventually becomes a pillar, though not necessarily of the isolated variety.

Shaft pillars are a case in point, as their stressing is influenced by the stress zones developed with the stoping on either side.

Development points through ground so stressed are subject to a very high rock-burst risk. Why this is so is not clear. Assuming the stress pattern in such an area represents a maximum of, say, four times the normal stress for that depth, raised to eight by superimposing the stress zone of the development end, the condition should be comparable to a development point at four times the depth. This does not appear to be the case, and the answer may be in the difference in reaction of rocks that have been heavily stressed over geological time as compared with those stressed over a short period only.

I am aware of no theoretical mathematics on the problem of such overlapping or superimposed stress zones. It is a complicated condition and appears to be a common factor in all preventable types of rock burst not related to

[5]For this and other footnotes see the list of references at the end of Part I of this article, on page 73; Dec. 1947, E.&M.J.

planes of weakness. The increased pressure results in greater compression of the rock concerned, thus more movement within the elastic limit, the cumulative effect of which must be to force more rock, through failure in shear, into the fracture zone, which in some measure may cause the unusually drummy nature of a pillar face.

Multiple openings imply multiple domes. Each opening controls its own dome up to the point where the reaction of the superimposed stress zone of another dome becomes acute. An unstable condition thus develops, which can be recovered only by the development of a common dome and stress zone over both openings. As in the case of the isolated pillar, the strain energy contained in the rock transferred in this process from the confined to the free state (fracture zone) must be released either gradually or suddenly as a rock burst.

From the general theory outlined it will be observed that the stress zone surrounding mine openings is the indication of the basic cause of rock bursts, while the fracture zone represents the effect of either gradual or sudden failure, under such stresses.

## The Sagging Hanging Wall

The sagging of the hanging wall in mines the world over has been one of the most conspicuous features of stoping at depth, and many theories have been developed to explain rock bursts with this feature as a base.[14,15]

I regard a sagging hanging wall only as an outward indication of the development of a fracture zone and its related dome. The difference in the behavior of a hanging wall (or footwall) at 500 ft. and 5,000 ft. of depth can be due only to the effect of pressure. As gravity assists hanging wall, but retards footwall disintegration, the fact that both contribute to wall closure suggests that, in the first instance, closure is due primarily to end loading, caused by contraction of the dome in developing its stress zone. If this is correct, a sagging hanging wall has no more significance than any other factor contributing to the fracture zone.

Another aspect to which I attach great importance is the relationship, as regards pressure effects, between depth and the smaller dimension of an orebody in the plane of the lode. If the dimensions of an orebody are defined as length, breadth and width, the smaller dimension refers to breadth. It has been suggested, other things being equal, that the breadth of an orebody, representing the ultimate stoping span, controls the final depth of penetration of the dome and fracture zone into the walls. There are good reasons for believing that breadth and depth are to some degree complementary; that is to say, an orebody of great breadth at moderate depth may create more pressure problems than one of less breadth at greater depth.

We know too little regarding the shape and growth of domes and fracture zones, but even with the inference that they tend to flatten as they develop, due to increasing arching stresses in the fracture zone, we are justified in assuming that an increasing volume of rock is brought within both the fracture and stress zones with each unit increase in stoping span. Theoretically, with hemispherical domes the relationship for the fracture zone is that of area to spherical volume. From Fig. 4, which for simplicity assumes a constant hemispherical shape and unrestricted growth for dome and fracture zone, it will be seen that by increasing the span from BH to AI a much larger volume of rock is brought within the fracture zone than for the corresponding increase in span from DF to CG. The comparison would also hold for the stress zone, as indicated in Fig. 2. The greater the span, the greater the percentage in volume of rock subjected to abnormal elastic strain with each unit increase in stoping span.

## Pressure From Breadth

This offers an explanation for the fact that orebodies of moderate breadth can successfully utilize mining and supporting methods that would be quite inadequate in larger orebodies with conditions otherwise comparable. The orebody of great breadth the world over has supplied us with our most outstanding pressure problems.

This principle is not to be confused with Irving's[13] reasoning, where in his estimation of so-called induced abutment loading, a stress distribution is introduced which bears no relationship to the mathematics of elasticity, and leads to the astounding conclusion that a grid system of pillar support will shorten stoping spans and thus reduce or eliminate rock bursts. This conclusion has been disproved in the Kolar field and, among other localities, in the Michigan Copper Country also. In the latter area, my information is that one mine working on such a principle successfully for a number of years, ultimately with increasing area, had to abandon the stoping section on account of rock bursts, with approximately 35% of the ore still in place as evenly spaced pillars.

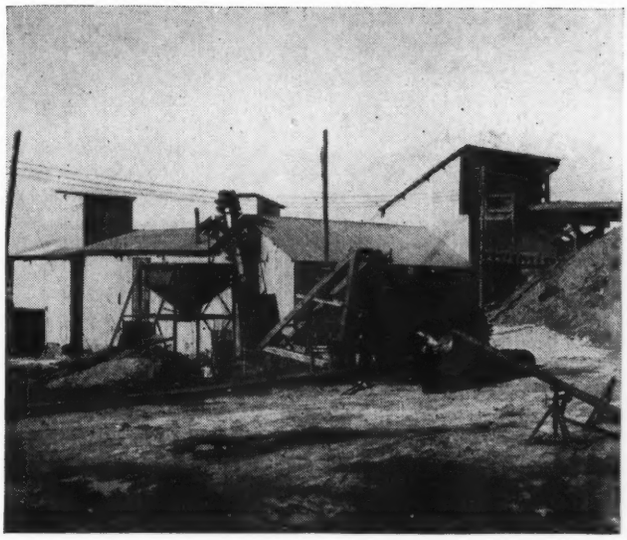
If 40 to 50% of the ore can be relegated to irrecoverable pillars, such a method might have possibilities; but, failing such a proportion, the theory I have outlined indicates that the superimposed stress zones over such pillar areas must ultimately overcome the resistance of individual domes and result in a series of rock bursts in the process of developing a single dome.

Yates and Shenon[9] have suggested as a classification for rock bursts the terms "inherent" and "induced" bursts. If one might make an exception of planes of weakness and, depending on conditions, include such bursts in either category, the inherent burst could cover those related to a single stress zone, while the induced burst would refer to those where superimposed stress zones were apparent.

With the correct combination of conditions the inherent burst would seem to be inevitable with the making of an excavation, the only protection being support, while the induced burst resulting from the proximity of two or more excavations can be overcome by laying out the mine to preclude that possibility. On this basis, the order in which an orebody is stoped is more important than the manner in which it should be supported.

## Bases of Theory

The foregoing general theory rests largely on the energy likely to be associated with a rock burst, the elastic behavior of rocks in the anomalous low-pressure range, and the characteristics of the resulting dome and fracture zone. None of these aspects has been exhaustively investigated, but the possibilities, consistent with accepted mathematical and physical principles, have been indicated in sufficient degree to enable the reader to examine with some confidence the nature and cause of rock bursts. The qualitative analogy which exists between the theoretical picture and actual conditions, in my opinion, justifies the application of this reasoning to the practical problem and this aspect follows in a future article.



DE SOTO MINING CO., RICHWOODS MILL. Rotating grizzly replacement in foreground.

MIDWEST MINING CO. MILL, with 1½-yd. diesel dragline and ¾-yd. diesel shovel.

# Barite Production Upheld By Improved Equipment

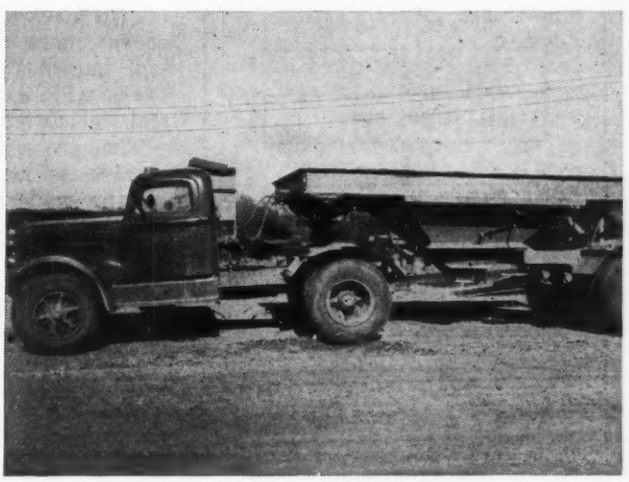
EVAN JUST
Editor

INTRODUCTION OF MODERN earth-moving equipment and more efficient beneficiation methods have given the old Washington County "tiff" diggings of southeastern Missouri a new lease on life.

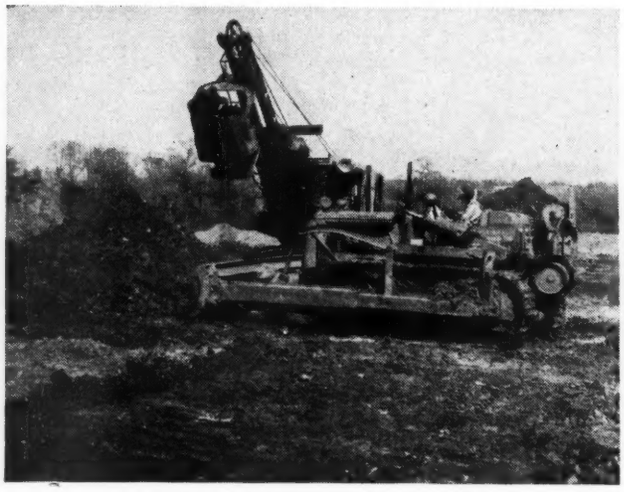
For over 100 years this area has been the nation's principal source of high-purity barite used for chemical, pigment and filler purposes. Until ten years ago it was notable for its primitive methods, the shallow diggings being mined entirely by hand and the product being hand picked and cleaned. Despite the considerable productivity of the district, the bulk of its working personnel earned rather low wages. Notwithstanding the rural environment, the squalid living conditions of many of the miners made many a headline and picture spread in crusading newspapers of nearby St. Louis.

By exercising its characteristic functions of raising output per man and of improving recoveries, better equipment has enabled the payment of better wages, a greater recovery per acre, and the reworking of many areas mined out by primitive methods. The barite occurs mainly in soil and mantle rock derived from weathering of the Potosi dolomite (Cambrian). Much of it is too fine to lend itself to hand methods, but is recovered in the present system of hauling the material to washing plants. However, the equipment in use is still comparatively simple, and much fine barite

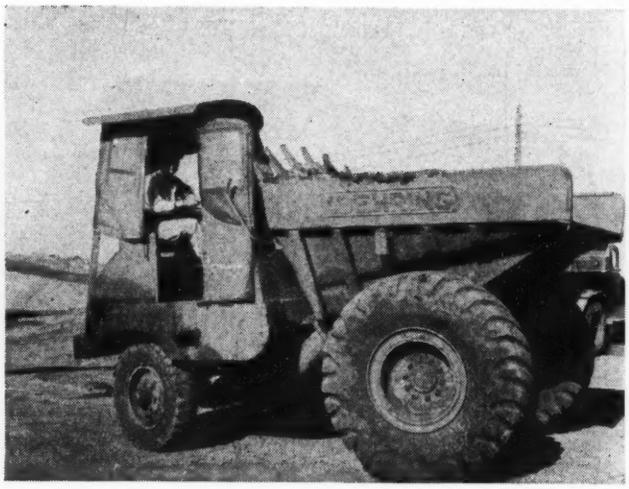
HAND-OPERATED NOZZLE washing mill heads at Baroid Sales Co. Richwoods plant. Traveling grizzly carries lumps at bottom to left.



LOCALLY-BUILT 13-ton truck trailer used for concentrate hauling by DeSoto Mining Co.

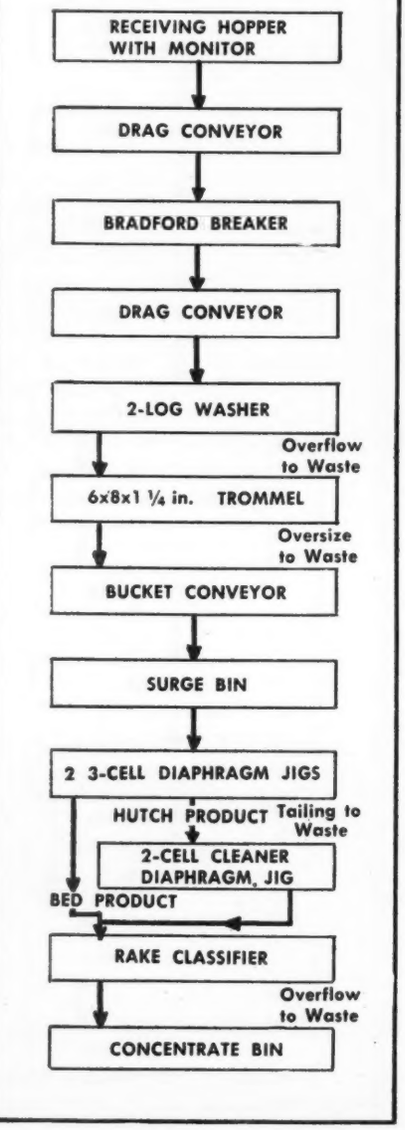


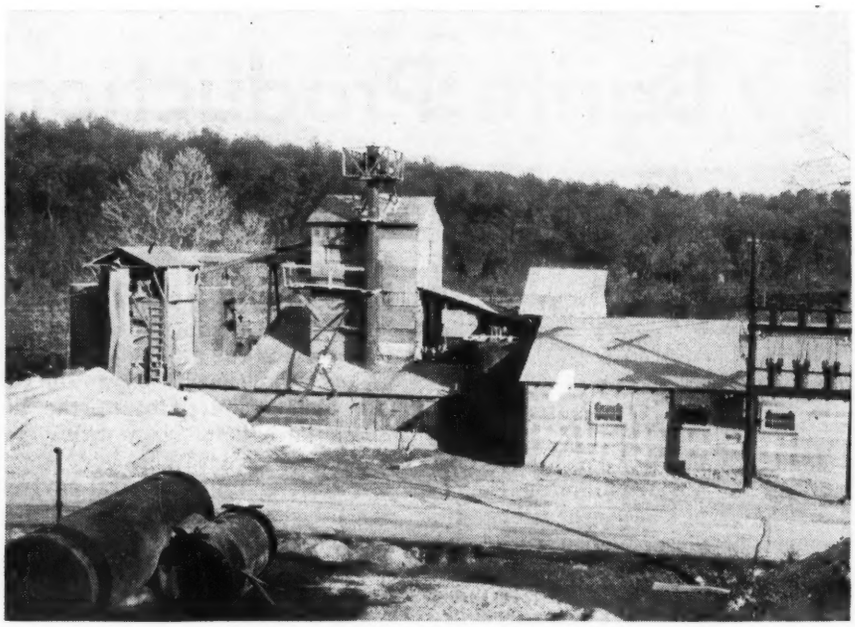
DIESEL-POWERED BULLDOZER helps ¾ yd. diesel shovel load ore into dump truck on Baroid Sales Co. Richwoods property.



DUMP TRUCK used by DeSoto Mining Co. in hauling ore from shovel to mill.

## MILL FLOWSHEET OF MIDWEST MINING CO.



MAGNETIC SEPARATION PLANT of Ray Dillinger at Tiff, Mo., for cleaning iron-bearing concentrates.

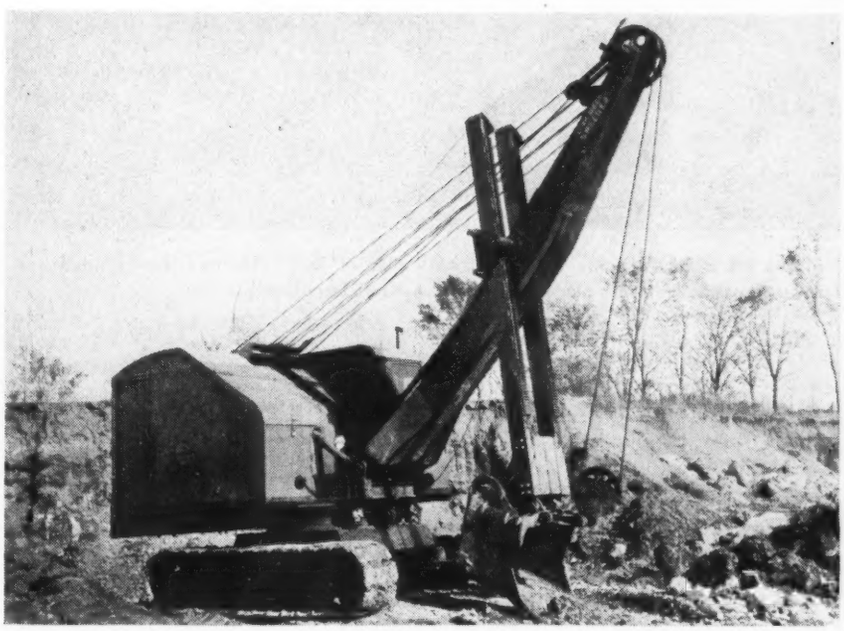
is still discarded. Probably in due course more elaborate flow sheets will improve the recovery of fine barite which now is lost as jig tails and washer and classifier overflows.

The present system of mining consists of loading the barite-containing material with diesel-powered, crawler-mounted shovels into dump trucks which carry it a short distance—up to one mile—to the washing plants. Because of the low ratio of barite to soil and gangue—approximately 1 to 10—the plants must be moved frequently to avoid excessive hauling costs. Thus, the plants must be readily knocked down and rebuilt. Incidentally, in this connection it seems likely that the future may bring forth a system of washing the material in small, highly portable plants close to the shovels and hauling a washed product to more elaborate and permanent concentrators. Such a system should lend itself both to lower transportation charges and to improved recoveries.

After the material is dumped into the plant receiving hoppers, in the typical mills it is subjected to a strong jet of water to remove soil and sand from the large chunks of geoidal quartz and barite characteristic of the Potosi formation outcrops, then is fed to a travelling grizzly on which the barite is sledged off the large chunks by hand, or to a rotating grizzly, which knocks off the barite by the shocks of being tumbled around. The large quartz chunks are then dis-

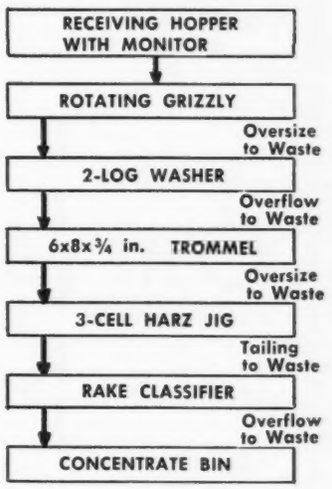
FLEET OF 10-YD. SIDE-DUMP DIESEL TRUCK TRAILERS used by Midwest Mining Co. for ore haulage.

DUMP TRUCK discharging into receiving hopper at Baroid Sales Co. Richwoods mill.



CRAWLER-MOUNTED DIESEL SHOVEL used by DeSoto Mining Co. at Richwoods diggings.

## MILL FLOWSHEET OF DeSOTO MINING CO.




carded, the grizzly undersize passing to log washers.

In the log washers, the material, still very muddy, is subjected to thorough agitation, beating and washing, which finally removes most of the mud, the overflow going to waste. The washed product passes to a trommel with a small-diameter discharge, the effect of the latter being to keep the trommel nearly half full of material, thus causing an active grinding action. The density of the barite makes it favor the bottom of the trommel and its cleavage permits the grinding action to knock it off the lumps of geoidal quartz to which much of it clings. As the barite is separated and reduced in size, it passes out through the ¾ in. trommel screen, while the quartzose material moves upward and passes out the end of the trommel. A remarkably good separation is effected by this apparently primitive treatment.

### Gravity Finishing

The undersize from the trommel passes to jigs. The jigs are crowded with feed, so that a bed of barite is maintained practically level with the overflow weir. The jig tails go to waste. The jig concentrate is sent to a rake classifier, which removes the fine silica as an overflow. The underflow is the main saleable product. A considerable amount of fine barite is lost to waste in the overflow. This loss appears to be an outstanding opportunity for metallurgical improvement.

The barite concentrates in a portion of Washington County contain a substantial amount of iron oxide. This product can be sold for oil-well drilling. However, three plants have been installed in the district to eliminate the iron by grinding, roasting and magnetic separation.

As a result of the mechanization of this industry, living standards of local labor have been raised and an area which would have declined seriously in production is again on the upgrade. Missouri's 1946 production of 270,850 tons was substantially higher than in any prior year. More than 20 washing plants are now operating in the Washington County area, and it seems likely that further expansion will develop.

EXTENSIVE HARD-ROCK tin workings are found at the top of this rhyolite crest. Soft orebodies at lower elevation were eroded and constitute the source for placer deposits. Note old placer gutter at lower left foreground

# Can Mexico's Tin Industry Be Modernized?

**There is merit in Mr. Atwater's suggestion that some more systematic operation by *gambusinos* would increase tin production. According to another competent observer, these "free-lance" miners, by washing a grade acceptable to ore buyers, lose almost as much fine tin stone as they recover in the coarse sizes. If a small mill were available to relieve the *gambusino* of the tasks of crushing, grinding, and crude concentration he would have more time to mine. With such changes, the production of tin in Mexico could perhaps be doubled.**

R. M. ATWATER, JR.
Mining Engineer, Chadds Ford, Pa.

PRODUCTION OF TIN in Mexico for domestic consumption is a well-established industry that dates back to pre-Conquest times. It has remained a completely "native" industry, using primitive methods. It none the less gives employment to 8,000 to 10,000 men, taking time that would otherwise be idle. So far, the only changes from the primitive methods have been the general adoption of a 5-ft. bar of drill steel, sharpened, which the Mexican miner uses like a spear, to attack the hard-rock occurrences of tin ore, and a wide acceptance of the country storekeeper as ore buyer for the three or four custom tin smelters (Mexican-owned and operated) in substitution for the former back-yard 'dobe furnace in which each miner smelted his own concentrates.

There is no "pay-roll" tin mining in Mexico. There never has been any, save for one or two short-lived ventures. The entire production of 800 to 1,200 tons of metal per year comes from the hand labor of the *gambusino*—the free-lance Mexican miner—who works for his own account. Generally, also, he is a small farmer; after his corn and beans are planted, at the beginning of the rainy season (June-October, inclusive), he goes tin mining up in the nearby hills, where he worked the year before and where his ancestors formerly worked. He is a skillful highgrader scratching the eyes out of the extensive, low-grade deposits, rarely using powder and confining his work, exclusively, to surface openings.

Roughly, half of the country's output comes from the hard-rock occurrences, the balance from the placers. The latter are worked in as primitive a manner as the other

occurrences. Only the dry, shallow, upper sections are attacked. Shafts, never over 20 ft. deep, are dug down to the pay-streak; no timber is used; when the workings start to cave, another shaft is sunk. The pay gravel is packed out by hand, and washed in a wooden *batea* at the nearest water-hole. Placer concentrates are of better quality than those from the hard-rock workings. They bring a higher price but involve much dead work.

The *gambusino* working in hard rock digs out the red, tin-bearing mineral from the tan-colored, rhyolite, his product running 5 to 20% tin. This he packs to the nearest water-hole, grinds it up on a flat rock, using a round one for a muller, then washes it on a *planilla*, a sloping slab of stone, and cleans it in a wooden *batea*. At this point a serious loss of values occurs. Part of the concentrates will consist of broken granules of clean cassiterite, varying in color from gray through yellow and red to brown and black. The bulk will be a red powder consisting of mixed hematite and cassiterite, so fine that the grinding given it is not enough for even approximate separation.

## Much Mineral Wasted

The *gambusino* scrapes off the clean cassiterite, running around 60% metallic tin, adds enough of the iron-bearing mineral containing about 25% tin, to make a 40% product, and deliberately throws the rest away. The material is unmarketable under current conditions.

When he has enough of his final product, he takes it to town and sells it to the local buyer. Both are expert in estimating the grade by hand and eye. In general, the *gambusino* receives about 30% of the current market price. The storekeeper gets the profit on the merchandise that forms part or all of the purchase price, plus a commission from the smelter.

The rainy months constitute the tin mining season. Actually about 120 days are worked. The hard-rock miner spends, roughly, half his time digging and the other half grinding, washing and selling his ore.

Careful checking shows that about 45% of the original metal content is lost, through rejection and wastage in washing. Inasmuch as 400 to 600 tons of bar tin is obtained annually from the hard-rock operations, this loss becomes worthy of attention.

When the water holes run dry the *gambusino* goes back home to his farm or other occupation; he figures on earning from his tin mining the equivalent of $100 to $150 (U. S. currency) each season. Sometimes he "hits it rich" and makes more.

## Prices Fluctuate Widely

The market price for concentrates is roughly based on the open market tin price. Both fluctuate widely. During the producing season the price swings down. When the smelters are selling bar metal to the consumers, after the mining season has ended, it invariably hardens.

There is no toll smelting of tin. All ore is bought by the ore buyers. The *gambusino* usually works alone. He is at the mercy of the buyer. Rarely is there competitive buying. The lots sold run from a few pounds to a 100-lb. sackful.

The market price for tin, in Mexico, generally runs above the international levels; during 1945 it held at the equivalent of $2 (U. S. currency) per pound; at the time of writing it is around $1 (rainy season) but will again increase after October.

When the buyer has accumulated a truckload, it is shipped to one of the three or four smelters, Mexican-owned and operated, at Durango, San Luis, Potosi, and Aguas Calientes. These are old-fashioned, being masonry stacks fired with charcoal, but do a pretty good job of smelting. The metal is refined in small kettles, requiring skill of a kind. None of the product is pure enough for tinplate for making cans.

The bar metal is sold, mostly through hardware stores, to small artisans all over the Republic.

Official statistics do not reflect the actual production of tin in Mexico, because only such metal as comes under the eyes of the tax collector gets into the records.

Such is Mexico's tin industry today. A few efforts have been made to mine tin in a more modern way. The description given, however, covers the present conditions of the industry.

## Will Increased Output Come From Modernizing?

The question naturally arises, can the production methods be modernized and the output increased? This was the basis for my recent study of the subject, taking 18 months, in the hill country of Durango and Zacatecas.

First, let us consider the nature of the tin occurrences. We are up against something different from those in the Straits, Bolivia and Europe.

All Mexico's known tin occurs in rhyolite, none in granite. Some is found in fissures in the ruptured andesite floor through which the rhyolite burst out. All through the central and northern highlands there are extensive ranges of rhyolite, with frequent isolated "outliers" of large size. Tin is found, here and there, in all of them. Most of the current production comes from the central states.

There must have been recurrent outbursts of rhyolite over a long period, for while much of it shows no tin at all, nearly every such range, or outlier, will show tin in some part. Evidently there was a tin-bearing period in the succession of extrusions.

Magmatic differentiation of the rhyolite masses has taken place on a titanic scale; every known related phase of rhyolite is found. Tin ore occurs in all of the types, even, though rarely, in the obsidian.

## Iron Chief Impurity

There is no recognized secondary enrichment of tin ore—at least not in Mexico. The principal associated mineral is hematite, generally the soft, red variety, but also the black, crystal type, specularite. Magnetite occurs, but sparsely.

Usually, no other base metals are present, but they do occur (especially bismuth) and must be taken into account, although the *gambusino* avoids the ore that carries them. Iron oxide is the invariable companion.

Extensive ranges of foot-hills rounded off by erosion and composed of massive, coarse-grained red rhyolite were inspected. In them the sandpile around every ant hill shows a little cassiterite, offering an easy method of prospecting. Rock samples, however, averaged only 2 lb. of tin to the ton—too little. The *gambusino* cleans up all the watercourses.

We found a curious condition in these hills. The rock adjoining many of the water courses has "rotted" *in place*, becoming as soft as an old pile of sawdust, for a hundred feet or more to each side and down to the stream bed. This soft material carries the same quantity of disseminated cassiterite as the hard rock, 2 lb. of metal per ton (3 lb. per cu. yd.), and is easily

scraped up and concentrated, yielding a good product. Some of these rotted basins contain 300,000 to 400,000 cu. yd. each—attractive dry placers.

Only half a mile from the railroad we found a unique occurrence of pale-green rhyolite, a very large tonnage all carrying tin. The cassiterite occurred as a very thin film, coating the quartz crystals, so thin that it would not concentrate. We bulk-sampled it thoroughly; assays showed around 2 lb. per ton, but even flotation gave hopelessly low results.

The *gambusino's* favorite working place is in the shrinkage-crack areas on the tops of the rhyolite cliffs. Evidently these places have suffered little erosion. The cracks, usually steep, vary from paper thickness up to a width of several inches. They are filled with scattered nodules of clean cassiterite and the fine-grained, mixed cassiterite and hematite precipitate. The country rock on each side of a crack is quite barren, but down below the crack zone the rock carries a little tin, the conditions resembling those in the rounded foothills where the ants do the mining. Probably erosion has removed the original shrinkage-crack tops from the latter.

These cracks have no great horizontal extension, or depth; the *gambusino* digs out the ore from the thicker ones, but works none under an inch wide.

This suggested some sampling tests. These showed that a half-inch crack every 6 ft. would mean 10 lb. of tin to the rock ton, when broken in quarry fashion, followed by hand-sorting. Study of the shrinkage-crack formations encourages the belief that there are many places where such an average exists over considerable areas.

## The Filled Gas Cavity

Going further, we found the *gambusino* working on a different type of structure. Evidently the rhyolite had "surged," leaving a huge, folded-over mass. The workings covered the surfaces only, sometimes for several acres, on a single structure, without exhausting the mineral showing. Recurrent streaks and patches of red mineral had been attacked and dug out, but never to a greater depth than 4 to 5 ft.

These are typical occurrences of the "gas-cavity filling" mineralization, where the fluoride vapor concentrated in the porous folds of the hardening rock, and was trapped.

These streaks, bands and patches show no parting from the enclosing host-rock; the red mineral merges quickly into the tan-colored rhyolite; often there also is a streak of amorphous quartz, but no sign of the entrance, or exit, of a mineralizing solution.

The rhyolite at these places is barren, finely crystallized, and much denser than that of the foothill, or shrinkage-crack structures, where it is coarsely crystalline.

At one of these "gas-cavity" diggings we found the only example we saw of work by the *gambusino* with hammer, drill and powder. They had followed a flat 6-in. band of the red mineral for 60 ft. into the ground, in a stope 3 to 4 ft. high and 20 ft. wide, and were continuing the work, although the streak had cut out on one side.

We sunk a shaft from surface to the deep end of this stope, through 15 ft. only of hard rock; it cut through eleven parallel streaks of red mineral, from ¼ to 2-in thick. We hand-sorted all the rock from this work, taking high-grade and fines down to our testing plant. It showed a recovery (by rocker-washing) of the equivalent of 22 lb. of tin (metal) per ton of rock broken. However, we all felt it was a better than average occurrence.

## Some Tin as Black Shot

Going further, we ran into a different kind of occurrence and mining methods; large bodies of the soft, white porphyry in which the cassiterite occurs as black shot, from marble size down to fine specks. These soft orebodies show, generally, at much lower elevations than those of the hard-rock type, due to the ease of erosion. They are the main source of all of Mexico's placer deposits.

They are actively worked by the *gambusinos*. Most of them lie at the upper end of an arroyo which has been placer-mined from the source downstream to where the bedrock is too deep for dry shafts.

This type is less amenable to hand-sorting, for it crumbles easily, after a few days' exposure. The cassiterite is scattered irregularly. The only noticeable feature was an apparent enrichment toward the outer limits. As far as observed, these deposits are generally thick and lenticular and several hundred feet across.

They can be mined by bulldozing, with a little help from powder. Possibly 50% of the quarry tonnage could be rejected in the open cut. Mill recovery should be good, for the black, shot-like cassiterite shells out, easily, but the mineral itself carries considerable iron.

We noticed where several such soft orebodies had been almost completely eroded from the tops of the rhyolite structures, leaving a white track down the mountainside with the remains of placer diggings.

## Hard-Rock Mining

We journeyed still further, 30 miles back into the hills, to an east-west range, reaching El Aguila mountain, a prominent land mark of Durango. There we found hard-rock tin mining on all sides, and two long arroyos, filled with white debris, each placer-mined for a mile or more.

One good-sized hill, aptly named La Colorada, showed another unique type of ore occurrence. The hard rhyolite was completely fractured into a loosened schist, made up of hand-sized pieces, the partings filled with the typical red precipitate of mixed hematite and cassiterite. The *gambusinos* had pecked at it, here and there, but given up. We washed samples; there was some tin, better than 2 lb. to the ton, but far from 22 lb. We tried to separate the mineral "filling" from the shell-like pieces of country rock by the simplest of crushing and "dry" tumbling. We succeeded, but our samples were taken from the surface only.

Nothing short of bulk samples run through a pilot mill, with hand-sorting where possible, can give a dependable valuation of such an orebody or, for that matter, of any of the structures inspected.

Back of La Colorada lies a ridge 3 miles long with hard-rock diggings at intervals along its length. At one place, an American owner had sunk a 60-ft. shaft, dug out the ore band showing, and quit. A *gambusino* took over and, after a little wall scratching, took out a single cluster of clean nodules of cassiterite weighing over a ton. That was in 1945.

On our way to El Aguila the trail ran along the exposed side of a white orebody, the face rising 50 to 60 ft. above the stream bed. The dry beach was a continuous placer digging. *Gambusinos* had scratched into the solid, in places, but the beach was more attractive.

High up on El Aguila we found still another occurrence. The shoulder had slipped down, revealing a

face, heavily mineralized with black specularite and cassiterite. The rhyolite is coarse crystalline, dark red and hard; the mineral is shiny black and equally hard. We traced three parallel fault fissures inside a zone 100 ft. wide. The mineral showed in streaks up to 2 in. thick, filling the fractures tightly frozen to the rock.

Several hundred pounds of samples were washed. The concentrates showed 20 to 25% tin. The grade of the ore was 10 to 20 lb. per ton. Our guide told us there are other like occurrences on El Aguila. The *gambusinos* know them, but the rock is too hard to work without hammer, drill and powder and they cannot sell a 25% concentrate.

## A Find in Zacatecas

We went into Zacatecas, through several well-known areas of regular production. Our objective was to look over a recent discovery. Some 25 miles across the flat valley from the railway, we found an isolated rhyolite hill, 5 miles in diameter and rising 800 to 900 ft. above the plain. It has been dissected by erosion, so that its interior lies wide open. The sides are still standing, except for a narrow outlet on the south side. Eight massive ribs of hard rock, like buttresses, extend from the shell towards the center. The prospector had dug pits on all of them. This occurrence was of a type different from anything we had seen. The rhyolite was siliceous and white; the tin showed in the cracks of intensely shattered shears, with a criss-cross pattern, running through the rock mass.

On the wide terrace, outside the hill, farmers had located what they called a tin placer, and scraped up several tons of marketable concentrates. Inspection showed it to be the outcrop of an orebody—roughly an acre in extent exposed—consisting of blocky yellow rhyolite, encrusted with tin mineral on the surfaces of the partings. Instead of a placer, it was an erosion residual; there was no water course within a mile. It was a true secondary enrichment, but not the kind we are used to. The tonnage of mineralized rock is large, but the grade has yet to be determined.

So far in this article, only single, typical occurrences have been described. Besides those called unique, we looked over a number of each kind and ran tests, by the score, in a well equipped laboratory. Even so, we did not see any occurrences in andesite fissures, nor any of the larger placers—only those where the *gambusinos* would be the only people interested in working them.

## Mexico Needs Its Tin

The original purpose of our investigation was to find if Mexico can supply the U. S. A. with some part of its tin requirements. We learned, in due course, that Mexico's own growing needs would have to be provided for first. The government is energetically pushing a policy of national industrialization. One of the most popular objectives is the building up of an export business in canned goods. Already Mexico enjoys an excellent domestic supply and consumption in those lines, but on a luxury basis, because tin cans must be imported or made from imported tinplate.

To encourage this development a new steel plant, rolling mill and tinplate unit have been installed, at Monclova, north of Monterrey, which already is in production. But their tin now has to be sent to the United States for refining. To remedy this situation, plans have been made to establish in the natural gas area a small but modern tin smelter and refinery, designed for increasing capacity.

Ore supply for this smelter presented a problem when the plan first was proposed, because of possible conflict with the old, established native industry. It appears easy of solution through the introduction of custom mills, in the tin-producing areas, to relieve the *gambusino* from the grinding and washing features of his operations.

## Losses to Avoid

Reference has been made to the *gambusino's* methods and, especially, to the serious losses involved. These the custom mill should avoid, as can be seen from the following illustration.

One of these men, working a hard rock deposit, will dig out, say, 2,500 lb. of "mineral" containing 350 lb. of tin (14% ore). From this he will wash out 1,000 lb. of *batea* concentrate, containing 320 lb. of tin (32% concentrate), losing 30 lb. in the handwashing process. From this he selects 200 lb. of clean cassiterite, a 60% concentrate containing 120 lb. tin. To it he adds 240 lb. of mixed iron and tin concentrate containing 60 lb. tin. Thus he gets 440 lb. of marketable 41% concentrate, containing 180 lb. tin. Of the 1000 lb. of batea concentrates he discards 560 lb., containing 140 lb. of tin plus the iron.

At a market price of $1 per lb. the *gambusino* would receive 30c. per lb. of contained tin, or 180x30 which equals $54. Instead, the custom mill will buy his original 2,500 lb. of 14% mineral, paying him the same price, $54 (probably somewhat less), thereby saving him half his time and labor. The 2,500 lb., containing 350 lb. of metal, will be milled with proper equipment, recovering 80% (at least) or 280 lb. of metal in the form of a concentrate, to be shipped to the proposed smelter for acid treatment (if necessary), smelting and refining.

Trucking and milling costs, at $10 per ton, plus freight, smelting and refining costs on the 0.5 ton of concentrate, at $100 per ton, will total about $65, plus ore purchase of $54-$109. The smelter yield (95% of 280 lb.) will be 266 lb., which sold at $1 per lb., less 8 cents for taxes, will bring $244, leaving a net, from operation, of $125 on 266 lb. of metal. This is around 50 cents per lb., which is high.

## An Increased Output

*But the important point is that the metal actually produced will be* 266 *lb. instead of* 170 *(the gambusino's* 180 *lb. less the smelter loss), an increase of* 96 *lb., or over* 50%.

The *gambusino*, saving the time and labor involved in grinding, washing and marketing his first lot of mineral, can dig out a second 2,500 lb. This will be a simple but effective improvement.

Perhaps the most important feature, in the long run, is that the *gambusino's* earnings can thus be doubled for the same working time. He should, moreover, receive cash in full from the custom mill, instead of goods from the country storekeeper.

I am hopeful that one or more such custom mills can be provided in the not-too-distant future. Such a mill also could serve as a pilot plant for bulk sampling and thus make possible the progressive valuation of the large, low-grade deposits.

The proposed smelter should provide a stable market for tin ore throughout the year. This has not heretofore existed in Mexico. A result could be the starting up of dragline operations on the extensive beds of deeper gravel, some of which carry gold as well as tin. Today there is not a single dredge or dragline at work in Mexico either on gold or tin.

# PERSONAL NEWS

**Horace Moses,** 69, for 40 years active in the metal mining industry of New Mexico and since 1938 general manager of Chino Mines Div., Kennecott Copper Corp., has announced his retirement, effective Dec. 1. He is succeeded by William H. Goodrich, formerly general superintendent.

**Francis E. Blanc** has been appointed field director of Boyles Bros. Drilling Co., Ltd., Vancouver, B. C. He has held the offices of president of Boyles Bros. Drilling (Philippine) Co., and managing director of Boyles Bros. Drilling (Singapore), Ltd. During the war he was a prisoner of the Japanese.

**Allan J. Anderson** has been appointed manager of the American Potash & Chemical Corporation plant at Trona, California, succeeding **Walter J. Metzer,** resigned. Mr. Anderson has been with his company since 1923.

**Carl J. Bischoff,** formerly chief engineer for Noranda Mines, Ltd., has established a consulting office at 147 Seventh St., Noranda, Quebec.

DRURY A. PIFER

**Dr. Drury A. Pifer** has been named acting director of the School of Mineral Enginering, University of Washington, succeeding **Dean Milnor Roberts,** retired.

**M. W. Okker,** formerly on the research staff of the Rhodesia Broken Hill Development Co., Broken Hill, Northern Rhodesia, is now mill superintendent for Messina (Transvaal) Development Co., South Africa.

**T. G. Digges** has been appointed chief of the Thermal Metallurgy Section of the National Bureau of Standards, succeeding **D. J. McAdam,** retired.

**Harvey S. Mudd** has become president and managing director of Cyprus Mines Corporation, Los Angeles, Calif., and **Henry T. Mudd** has been appointed general manager of that firm and its two subsidiaries, Coronado Copper and Zinc Co. and Cia. Minera Acme, S. A. **James L. Bruce** has resigned as general manager of Cyprus Mines to become consulting engineer, and has also resigned as president of Coronado Copper and Zinc and Cia. Minera Acme, S. A. **Roy W. Moore,** manager of Coronado has been elected president of that company, and **Blair W. Stewart** is vice president and manager of Cia. Minera Acme.

Because of unforeseen delays the editorial material covering the Markets, Washington Reflections, and News of the Industry sections has been omitted from this issue. This material will be sent separately to subscribers within a few days.

**Homer C. Nordling,** who has been with Alaska-Juneau Gold Mining Co. for 30 years, has resigned as chief electrical engineer, and will fill a similar position with C.A.A., with headquarters at Anchorage.

**John B. Maitland, James P. Dunnigan,** of West Branch, Mich., **K. J. Howard O'Connor,** New York City, **C. M. Wacaster,** Holly Springs, Ga., and **R. G. Lichtenstein,** Oil City, Pa., have been elected members of the board of directors of Mica Products Corporation of **Franklin, N. C.**

**B. W. Reeves** has been appointed vice president of Lake Shore Engineering Co., Iron Mountain, Mich., succeeding **W. B. Thompson,** retired. Mr. Reeves, formerly with Goodyear Tire & Rubber Co., has been in Duluth for the past two years, as a Goodyear consultant for the iron ore operators on the Mesabi and other ranges.

**John C. Davey,** who recently returned to England on completion of four years' service as consulting mining engineer to the Government of Venezuela, has accepted the appointment of general manager of The Egyptian Phosphate Co., which is interested in the African phosphate industry and operates a group of mines in Egypt. Mr. Davey's headquarters are at Safaga, Upper Egypt.

**L. Lubett,** formerly on the staff of Nundydroog Mines Ltd., has joined Ayrton Metals Limited of London as general manager.

**Dr. W. V. Smitheringale** has joined the staff of Conwest Exploration Co., Ltd., and is stationed at the silver-lead property of Keno Hill Mining Co., Ltd., a subsidiary, at Mayo, Yukon. **H. Brodie Hicks** is in charge of the firm's exploration work in Yukon.

**William M. McGill,** assistant state geologist of Virginia since 1929, has been appointed State Geologist, to succeed **Arthur Bevan,** who resigned.

**J. G. Piercey** has been appointed mine manager of Silbak Premier Mines, Ltd., B. C., succeeding **D. L. Coulter,** who has resigned. **J. C. Mc Cutcheon** is now mine superintendent and **S. M. McDonald,** mill superintendent.

**Andrew J. Martin** has been appointed supervising engineer of the Metal Economics Division's Denver Office, U. S. Bureau of Mines, succeeding the late **George E. Woodward.** Associated with the Bureau for nearly 24 years, Mr. Martin has been engaged during most of this period in studies of the economics and statistics of the mineral industries.

**William Marshall** has been appointed mine manager of the Emerald tungsten mine of Canadian Exploration, Ltd., Vancouver, B. C. **Hal Powell** is mine superintendent and **B. N. Murphy** is chief engineer. **H. L. Batten** is managing director.

**Arthur B. Irwin** has joined the engineering staff of the British Columbia Department of Mines.

MILNOR ROBERTS

**J. A. Limerick** has been appointed manager of Luipaards Vlei Estate and Gold Mining Co., Ltd., Krugersdorp, South Africa, succeeding **R. M. Donaldson,** retired.

**Dr. Joseph T. Mandy,** consulting mining engineer, Vancouver, B. C., has returned to his headquarters in the Royal Bank Building on completion of examination work in northern, western and central British Columbia.

**Gavin A. Dirom,** formerly in charge of exploration in British Columbia for Premier Gold Mining Co., Ltd., has been transferred to the Salt Lake City office of the American Smelting and Refining Co., Ltd.

**William St.C. Dunn,** who returned to the engineering staff of Bralorne Mines, Ltd., following his discharge two years ago from the Royal Canadian Engineers, has accepted a position on the staff of Silver Standard Mines, Ltd.

**Leonard G. White** has been named mine manager of Jason Mines, Ltd., Casummit Lake, Ontario. He was formerly mine manager of Brown-McDade Mines, Ltd., Yukon.

**Carrol Weed,** general superintendent, Inspiration Consolidated Copper Co., was elected chairman of the mining division, Arizona section, American Institute of Mining and Metallurgical Engineers, succeeding **Wesley P. Goss.**

**Durward R. Schooler,** assistant professor of mining engineering at the Missouri School of Mines recently resigned to accept a position as consulting engineer for the Paul Weir Co., Chicago.

**C. L. Lamb** and **M. W. Rushton** of the management staff of Anglo-American Corporation, Johannesburg, South Africa, have been assigned new positions. Mr. Lamb will be manager of Daggafontein Mines, and Mr. Rushton goes to Springs Mines as manager. These two engineers made many friends in the United States during their recent inspection trip to many American mining companies.

The Committee on Foreign Compendia of the American Chemical Society has been advised that the groups preparing new volumes of Beilstein's Handbuch and Gmelin's Handbuch are handicapped by the lack of copies of Engineering and Mining Journal for 1939 and subsequent numbers to this date. **Professor H. B. Hass,** Head, Department of Chemistry, Purdue University, Lafayette, Inc., asks that anyone wishing to donate one or more volumes of the magazines get in touch with him.

**Sam Hancock** has left California for Siam and Burma, where he will be engaged in a consulting capacity for London and South African dredging interests. Mr. Hancock plans to establish a consulting office in Vancouver in 1948, specializing in gold dredging.

**Dr. William Embry Wrather,** director, U. S. Geological Survey, Washington, D. C., has been elected president of the American Institute of Mining and Metallurgical Engineers. **C. Harry Benedict,** Calumet & Hecla Consolidated Copper Co., and **Donald H. McLaughlin,** president, Homestake Mining Co., were elected vice presidents.

Five new directors of the Institute are: **Newell G. Alford,** consulting engineer, Pittsburgh, Pa.; **Richard J. Ennis,** general manager, McIntyre-Porcupine Mines, Ltd., Schumacher, Ont., Canada; **J. B. Haffner,** general manager, Bunker Hill & Sullivan Mining & Concentrating Co., Kellogg, Idaho; **Albert J. Phillips,** superintendent, research department, American Smelting & Refining Co., Barber, N. J.; and **C. P. Watson,** Vice President, Seaboard Oil Co., Los Angeles, Calif.

**Hugh H. Bein,** engineer and geologist for Best Mines Co. at Downieville, Calif., has resigned and has gone to the Philippine Islands.

**C. J. Barber** has resigned his position with Cia. re Real del Monte y Pachuca, Pachuca, Mexico, and will join the United States Smelting Refining and Mining Co., Salt Lake City, Utah, in Jan. 1948.

**W. H. Hoover** has been elected a director of the Anaconda Copper Mining Co., of which he is vice president and general counsel. He succeeds **W. D. Thornton** on the board.

**Rowland King** (Sunshine Mining Co.) has been elected president of the Northwest Mining Association. **J. E. Berg,** Federal Mining & Smelting Co., was elected vice president.

**Sheldon P. Wimpfen,** 34, assistant editor of *Mining and Metallurgy,* will become editor of the *Mining Congress Journal* on January 1. Mr. Wimpfen graduated from the College of Mines and Metallurgy, University of Texas, in 1934 and began his professional career at Shafter, Texas, as a mine

SHELDON P. WIMPFEN

engineer for the American Metal Co. of Texas. As construction officer for a Marine Corps Air Group during the war, he planned, built, and maintained the camp, working area, and all facilities on Ie Shima and Okinawa. Mr. Wimpfen has held his present position for the past two years.

**William A. O'Neill** has announced the opening of a mining engineering consulting office in Anchorage, Alaska, to serve Alaska and Yukon Territory. This office will engage in making surveys and examinations, as well as direct prospecting and development work. Mr. O'Neill is a graduate of the University of Alaska School of Mines, and has been associated with the mining industry for 25 years.

**Norman F. Brookes** has been elected managing director of Van Roi Mines (1947), Ltd., Sandon, British Columbia. He was formerly mine manager of Central Zeballos Gold Mines, Ltd.

**S. J. Crocker,** president and managing director of B. C. Equipment Co., Ltd., has been elected a director of Sheep Creek Gold Mines, Ltd.

**F. A. Linforth,** formerly assistant to the manager of mines, Anaconda Copper Mining Co., has been appointed assistant to the vice president. In his new position Mr. Linforth will perform special duties in connection

F. A. LINFORTH

with the mining and metallurgical operations of the company.

**Dr. Lester W. Strock** has announced that in keeping with the increased scope of its activities the name of the consulting laboratories of which he is vice president and director of research has been changed from Spectrographic Services and Supplies, Inc., to Saratoga Laboratories, Inc. The firm is in Saratoga Springs, N. Y.

The Pan American Institute of Mining Engineering and Geology has elected the following new officers of the United States Section: **W. D. Johnston, Jr.,** U. S. Geological Survey, chairman; **Francis Cameron** and **George M. Knebel,** vice chairmen; **Edward J. Craig,** secretary-treasurer; Francis Cameron, M. L. Jacobs, W. D. Johnston, Jr., George M Knebel, Thomas H. Miller, Richard S. Newlin, Edward Steidle, Arthur T. Ward, William E. Wrather, and Charles Will Wright, directors. The next meeting of the Institute will be in conjunction with the AIME in New York in February 1948, when a program of papers on Latin America will be presented. The annual luncheon will be held at that time. Plans are being made for the Third Congress of Pan American Mining Engineering and Geology to be held in the United States in 1949. The Second Congress met in Rio de Janeiro, Brazil, in 1946.

**William James Bichan,** assistant professor of geology at the University

of New Brunswick, Canada, and recently in charge of mineral exploration in the pre-Cambrian formations of that province, has been appointed director of mineral resources in the provincial department of natural resources.

**Dr. Walter Renton Ingalls,** well known metallurgist and mineral economist, retired Jan. 1 as director of the American Bureau of Metal Statistics, which post he has held since 1921. Prior to that time he was editor of *Engineering and Mining Journal.* Dr. Ingalls is succeeded by **R. R. Eckert,** who is also secretary-treasurer of the Copper Institute and the U. S. Copper Association.

**Gloyd M. Wiles** has been appointed chairman of the mining committee of the National Lead Co., New York, N. Y. He was formerly plant manager of the company's MacIntyre development at Tahawus, N. Y.

**James C. Gray,** Birmingham, general superintendent of coal mines, Tennessee Coal, Iron & Railroad Company, has been elected chairman of the Southeast section of the American Institute of Mining and Metallurgical Engineers. Dr. Gray succeeds **Dr. Walter B. Jones,** Tuscaloosa, Alabama, state geologist.

Other officers elected include **W. C. Chase,** Birmingham, general superintendent of mines, Alabama By-Products Corp., first vice-chairman, and **W. C. McKenzie,** Bessemer, chief engineer of ore mines and quarries for TCI, as second vice-chairman. **R. Q. Shotts,** Tuscaloosa, School of Mines. University of Alabama, was elected secretary-treasurer.

**Clyde Williams,** president of the A.I.M.M., addressed the annual meeting in Birmingham, tracing progress made in industrial research.

**P. Gudmar Kihlstedt,** general superintendent of mills, Boliden Mining Co., has returned to Sweden after several weeks of visiting milling plants throughout the United States and Canada.

**Robert J. Brison,** formerly a field engineer with the Denver Equipment Co., has joined the staff of Battelle Memorial Institute, Columbus, Ohio, where he will conduct ore dressing and mineral processing research. Mr. Brison is a graduate of Queen's University, Kingston, Ontario.

**Norman L. Deuble** has joined the metallurgical engineering staff of Climax Molybdenum Co., Climax, Colo. For the last four years he has been with the M. W. Kellogg Co., Jersey City, N. J., in charge of special processes and work in the high temperature laboratory. Prior to that time Mr. Deuble was active for 20 years in alloy steel metallurgy with the Republic Steel Corp. and its predecessor, the United Alloy Steel Corp.

**Dean James Kip Finch** of Columbia University's School of Engineering has been named an "Officer de L'Instruction Publique" and has received the French "Ordre des Palmes Academiques," the highest award that can be bestowed by the Secretary of National Education in France. This award has been given to Dean Finch for a scientific article written 17 years ago entitled "French Pioneers in Engineering," a study of the contributions of eight French engineers of the 17th and 18th centuries.—(ENGINEERING NEWS RECORD, April 24, 1930.)

**Lawrence A. Roe,** research engineer for Jones & Laughlin Steel Corp., is now working at the company's ore research laboratory in Negaunee, Mich.

**Rogers Peale,** San Francisco mining geologist, is in Nicaragua on professional business.

**N. K. Karchmer** has been appointed vice president in charge of operations and plant manager of Commercialores,

**N. K. KARCHMER**

Inc. This company is engaged in exploiting a kyanite deposit on Henry Knob, near Clover, S. C., and expects to offer raw and calcined kyanite to the refractory and ceramic industries.

**Harold Klempner,** who resigned recently from the engineering staff of Giant Yellowknife Gold Mines, Ltd., has taken a position on the staff of the Powell River Company at Powell River, B. C.

**Richard Quirk,** formerly underground manager, New Occidental Gold Mines, N. L., Cobar, New South Wales, is now mining engineer with the Cerro de Pasco Copper Corp., Peru.

## OBITUARIES

**Samuel W. Traylor, Sr.,** nationally known mining expert, died Nov. 12 in Stuart, Fla., where he was spending the winter. Mr. Traylor was 78. A graduate of the University of Kansas, he became affiliated as a mining engineer with the Colorado Iron Works Co., and in 1900 opened an office as a consulting mining engineer. In 1901, he established the Traylor Engineering and Mining Co.

**Dan J. Reed, 53,** a safety engineer for the Tennessee Coal, Iron & Railroad Co., died Nov. 11 at Birmingham, Ala., after suffering a heart attack in the Hamilton Slope coal mine. He had been associated with the company for 30 years.

**Charles M. Fueller,** 80, well known mining engineer and geologist, died in California Nov. 19. He was connected with western mining for more than 40 years, and had been consulting engineer for the Phelps Dodge Corp.

**Hermon W. Horne,** 86, mining engineer formerly of Utah, died in Glendale, Calif., recently. Mr. Horne had been with the Utah Copper Co. from 1922 until his retirement several years ago.

**L. J. Deranleau, 54,** retired official of the Andes Copper Mining Co., died at Anaconda on Nov. 7. He had been with the Andes organization for 16 years.

**Ernest N. Patty, Jr., 26,** son of **E. N. Patty,** prominent Alaska mining man, was killed in his amphibian plane on a mountain 65 miles from Fairbanks on his last flight of the season from his father's mining operations at Woodchopper. He was associated with his father in this work. Services were conducted at Seattle Nov. 7. Mr. Patty was an air force navigator during World War II and had received the Distinguished Flying Cross and other decorations.

**Richard J. Evans, 82,** who aided in the development of many Utah mines and served six times as president of the Salt Lake Stock Exchange, died Dec. 2 in Salt Lake City.

**Urpo Kyto,** president of the Lucky Boy Mining Co., Hawthorne, Nev., and Silver Shield Mining & Milling Co. of Utah, died recently in a Duluth hospital, from injuries sustained in an automobile collision.

## LETTERS

### Policy on Gold

**The Editor:**

We have just finished reading your editorial of the September issue, "Government's Policy on Gold Unsound," and we were very much gratified to know that your opinion is exactly the same as ours.

It is also too bad that other gold producing countries which are in far greater need of currency revision than is even the United States are compelled, for reasons with which gold has nothing to do, to follow the lead

of the United States down this dark alley. Here in Colombia the gold mining industry is being slowly throttled to death although it is obvious that the economy of the country cannot be kept on an even keel without a big increase in its gold production.

C. J. LONDON and V. M. LAVERY
*Cali, Colombia*
October 14, 1947

## Wear of Grinding Balls

**The Editor:**

O. E. B. Timmerman's article on "Factors in Relative Wear of Grinding Balls" in *E.&M.J.*, May, 1947, is very interesting, but it does not state what method was used to measure the amount of grinding or work done. It is possible that all tests were run for an equal length of time; this is indicated by the amount of total ball wear tabulated.

**Amount of Total Ball Wear**

| | Total Ball Wear in Grams | % Solids | Feed |
|---|---|---|---|
| **Test 1—** | | | |
| Mill 1.... | 159.61 | 30 | 98%— 3-20 |
| Mill 2.... | 159.87 | 35 | 96%—10-48 |
| Mill 3.... | 158.06 | 40 | 82%—28-150 |
| **Test 2—** | | | |
| Mill 1.... | 159.61 | 30 | 98%— 3-20 |

These tests indicate that, with the same size mill and ball charge, the total ball wear is not affected by change in feed size or percent solids of the pulp.

Test No. 3 was run with a mill of different diameter and different critical speed. The feed and ball charge was the same as previous tests. The ball wear was 142.62 grams. The reduced ball wear cannot be interpreted without knowing the amount of work done either in a horsepower-hour or the new surface area produced.

In Test No. 2, Mill 2 and 3, the proportion of large to small balls was changed, resulting in the following total wear.

Test 2, Mill 2, 54 large balls, 172 small balls, 125.44 grams wear. Mill 3, 64 large balls, 122 small balls, 123.36 grams wear.

In these two tests there was a greater amount of large balls having a hardness of Rockwell C 63 and fewer small balls having a hardness of 43. This would affect the wear rate.

The mill man is interested in the total ball wear and the factors that affect this wear rate. The article might indicate some of the factors if a unit of work were available to compare the various tests.

R. C. FERGUSON
*Hardinge Co., Inc.*
*York, Penna.*
May 16, 1947

**The Editor:**

In reply to Mr. Ferguson's letter I would like to stress the following points:

a. The object of the tests was not to determine total ball wear but the wear of balls of different sizes in a mixed ball load.
b. The useful work done was not determined, because the aim was to show that balls of different sizes wear at different rates under varying operating conditions, even though there is little difference in total ball wear.
c. All tests were run for an equal length of time.

I quite agree with Mr. Ferguson that the hardness of the balls will affect the wear rate. This was pointed out in the article.

O. E. B. TIMMERMANS
*Northern Rhodesia*
Oct. 6, 1947

## Premium Price Plan

**The Editor:**

President Truman's memorandum of disapproval of the bill H.R. 1602, providing for extending the Premium Price Plan included the following: "...the plan provided by this bill would be too inflexible to meet present needs..."

"Now lead is the scarcest of these three metals...yet this bill would not permit any major revisions in payments to shift the emphasis from zinc to copper and lead production."

The bill in question provided merely for the extension of the Premium Price Plan for two years. For five and a half years prior to the proposed effective date of the bill, the Plan had been operated at the almost complete discretion of the Executive. During that time it had proved sufficiently flexible to absorb the impact of severe labor shortages, several wage increases, total cost increases in the order of magnitude of 60%, development deficiencies, amortization of large capital investments, the change from a controlled to a free market, and a host of less severe strains. H.R. 1602 not only refrained from limiting Executive discretion, but increased its scope by omission of the restrictive "terms not less favorable than heretofore" clause which had appeared in Public Law 548.

About a year before the veto, far-reaching changes had been made in the Plan with the prime purpose of stimulating lead production. It is necessary to outline their background.

In Western complex ores, silver is generally associated with the lead minerals; that is, high lead ores carry high silver, high zinc ores carry low silver, and in selective flotation some 75% of the silver falls in the lead concentrate.

Zinc was crucially short in the early war years, and to set the economic climate for preferential mining of zinc ores over lead ores, two basic factors in the calculation of allowable operating margins were slanted away from lead:

1. No allowance was made for silver values.
2. In calculating pounds of metal for margin purposes, lead was weighted at 80%, zinc at 100%.

The production record of Western complex ores for the major war years is tabulated.

**Output of Western Complex Ores, 1941-44**

| Year | Thousands of Tons Ore | Lead | Zinc | Recoverable Grade of Ore % Lead | % Zinc |
|---|---|---|---|---|---|
| 1941.. | 5,166 | 217 | 253 | 4.2 | 4.9 |
| 2.. | 5,633 | 230 | 286 | 4.1 | 5.1 |
| 3.. | 6,049 | 208 | 299 | 3.4 | 5.1 |
| 4.. | 6,137 | 183 | 303 | 3.0 | 4.9 |

When it became apparent that the emphasis should be shifted to the production of lead ores, the factors noted were changed, in the summer of 1946:

1. 25% of net smelter returns on precious metals was allowed in the margin.
2. Lead was weighted in proportion to the ratio of its market price to that of zinc.

The effects of these changes may be judged by considering the position of an operator before and after they were made. Let us assume that he has an operating cost of $11 a ton, a marketing cost of 50% of the gross value, his prices are those of midsummer, 1946, and he has a choice of mining two grades of ore from his mine:

| | High Zinc | High Lead |
|---|---|---|
| Ounces Gold ..... | 0.005 | 0.01 |
| Ounces Silver ..... | 2.0 | 5.0 |
| % Lead ..... | 4.0 | 8.0 |
| % Zinc ..... | 8.0 | 4.0 |

After adjustment for treatment losses, his calculations on these two grades during the war years would have shown:

| | Per Ton Ore High Zinc | High Lead |
|---|---|---|
| Net Market Value... | $8.38 | $10.43 |
| Allowable Margin ... | 2.04 | 1.95 |

The incentive to mine the less valuable ores for a better margin is obvious.

After the changes of 1946 described above, similar calculations would have shown:

| | High Zinc | High Lead |
|---|---|---|
| Net Market Value... | $8.38 | $10.43 |
| Allowable Margin ... | 2.97 | 4.05 |

W. C. BROADGATE
*Technical Consultant,*
*Mining Subcommittee*
*Senate Small Business Committee*
October 7, 1947

## Retimbering Old Workings

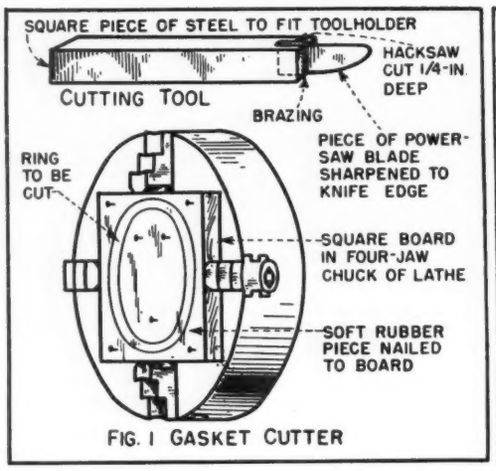
**The Editor:**

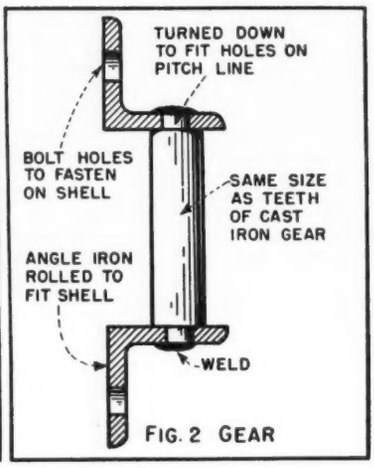
Your letter in the July issue from Wade V. Lewis on sampling old properties has prompted me to write on another important subject relative to old workings.

There has been a great interest and considerable activity in recent years in old mines and districts with early production records. This began in the

(Continued on p. 105)

# OPERATING IDEAS


SQUARE PIECE OF STEEL TO FIT TOOLHOLDER
HACKSAW CUT 1/4-IN. DEEP
CUTTING TOOL
BRAZING
PIECE OF POWER-SAW BLADE SHARPENED TO KNIFE EDGE
RING TO BE CUT
SQUARE BOARD IN FOUR-JAW CHUCK OF LATHE
SOFT RUBBER PIECE NAILED TO BOARD
FIG. 1 GASKET CUTTER


TURNED DOWN TO FIT HOLES ON PITCH LINE
BOLT HOLES TO FASTEN ON SHELL
SAME SIZE AS TEETH OF CAST IRON GEAR
ANGLE IRON ROLLED TO FIT SHELL
WELD
FIG. 2 GEAR

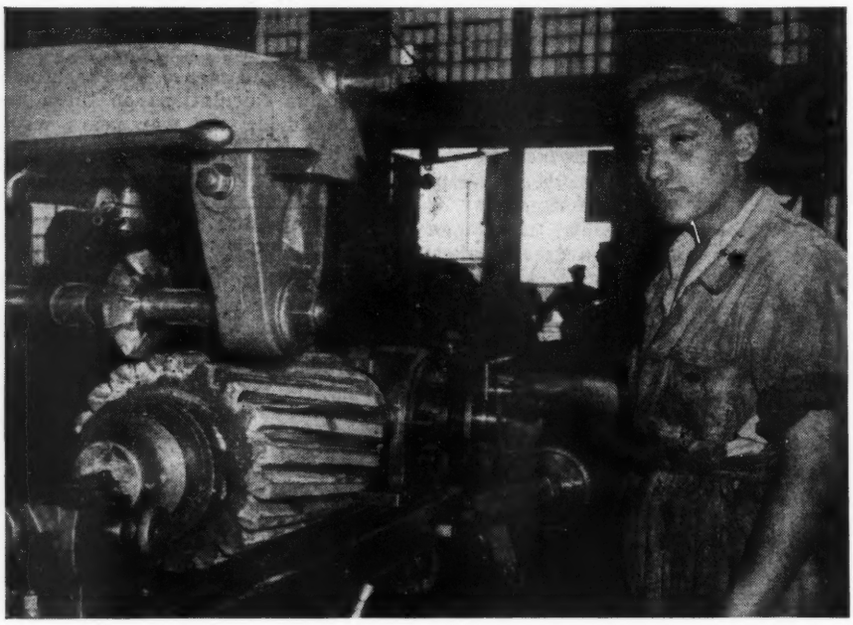
## Shop Shortcuts

The following shop shortcuts and illustrations are submitted by Charles Labbe, Las Vegas, Nev. Fig. 1 shows a method of cutting gaskets, packing or seal rings out of sheet rubber with an ordinary lathe tool. This is for gaskets too large to be punched out.

The cutting tool is prepared as shown. Then a piece of soft rubber is tacked to a block of wood mounted in the lathe chuck. The cutting tool is mounted in the tool holder and set to cut the inner circle; then the outer circle. A smooth ring or gasket results.

Gaskets can be prepared in a similar way on a drill press. A double tool holder is used, however, and the inner piece of the ring is cut out first. It is also important to keep the rubber from wrinkling while the tool is in a deep cut. Rings of sheet lead to fit grooved flanges of high-pressure pipe can be prepared in the same way.

Figure 2 is a fabricated gear for a trommel screen which was devised to replace cast gears that failed because gravel became enmeshed in the teeth at times. Four pieces of two-inch heavy angle iron were rolled to fit the outside diameter of the shell, traced to the pitch line, and drilled for short pieces of mild steel that form the teeth. Construction details are shown. Then the angle iron pieces were bolted to the shell. Chief advantage of this type of construction is that the bottom of the mesh is open. These openings allow the gravel particles to fall out.



## Cast Bronze Pinion Drives Ball Mill

During the war, Andes Copper Mining Co., Potrerillos, Chile, leaned heavily on the ingenuity of its mechanical department for equipment replacements. For example, the pinion gears (12½ in. diameter, 18 in. long) that drive the company's 20 ball mills have an average life of about a year. Replacement became a problem after the war started. Two satisfactory solutions were found by C. P. Love, mechanical superintendent.

The first method tested was to build up worn-out gears with P & H coated "boiler" welding rod, then heat treat them and cut the teeth. It was found preferable, however, to use sections of broken gyratory crusher shafts, varying in diameter from 14 to 20 in. All gear cutting is done on a No. 3 Cincinnati milling machine, which is really too small for the job, as can be seen from the accompanying photograph.

### Second Method

The second method, and the one which seems more promising, is to cast the gears in bronze with the teeth roughly shaped, then finish them on the milling machine. A bronze containing 89% copper, 11% aluminum is used; a small amount of iron from the stirring rods is also present. The gears are sand-cast, shaken out of the mold as soon as solidified, then left hanging on a crane hook all night, a procedure giving the effect of heat treatment.

The resulting gear has a Brinnell hardness of 60 points more than cold rolled steel, yet it is believed that it operates with less friction than steel, and that it causes less wear of the ball-mill bull gears. The cast gears have not been running long enough, however, to furnish accurate comparisons.

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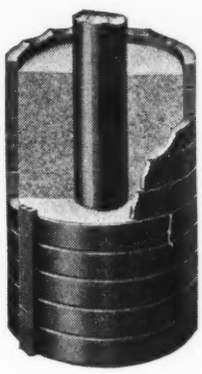
## HAVE ALL FOUR VITAL CHARACTERISTICS FOR SAFE, DEPENDABLE MINE HAULAGE SERVICE

1. **HIGH POWER ABILITY** . . . abundant reserve power plus an ability to discharge at high rates.
2. **HIGH ELECTRICAL EFFICIENCY** . . . hence low power costs.
3. **RUGGEDNESS** . . . to withstand hard usage.
4. **LONG LIFE *and* MINIMUM MAINTENANCE** . . . which add up to better service at a saving.

Because of these outstanding qualities, Exide-Ironclad Batteries are used by more mine operators than all other batteries combined.

Most batteries look much alike on the surface. But inside are the differences that determine power, performance and battery life. One notable difference in Exide-Ironclad construction is the positive plate.



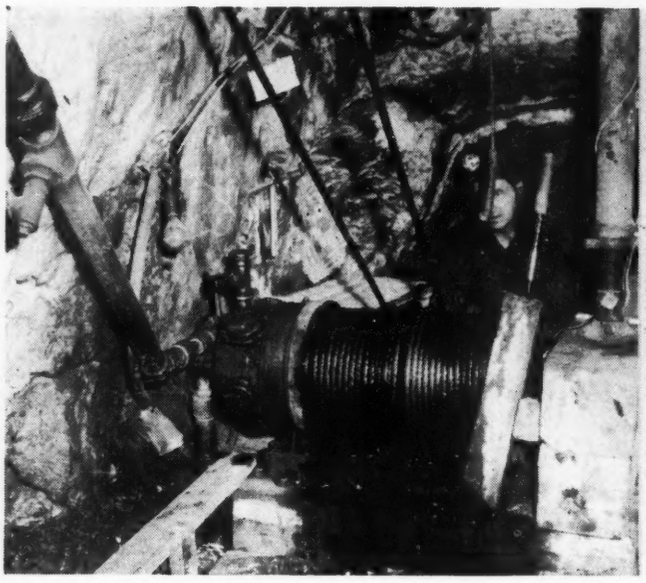
**THE POSITIVE PLATE** consists of a series of slotted tubes which contain the active material (see small illustration at left). So fine are these slots that, while permitting easy access of electrolyte, they retard active material from readily washing out . . . thus assuring years of safe, dependable, day in and day out mine haulage service.

If you have a special battery problem, or wish more detailed information, write for booklet Form 1982.

•

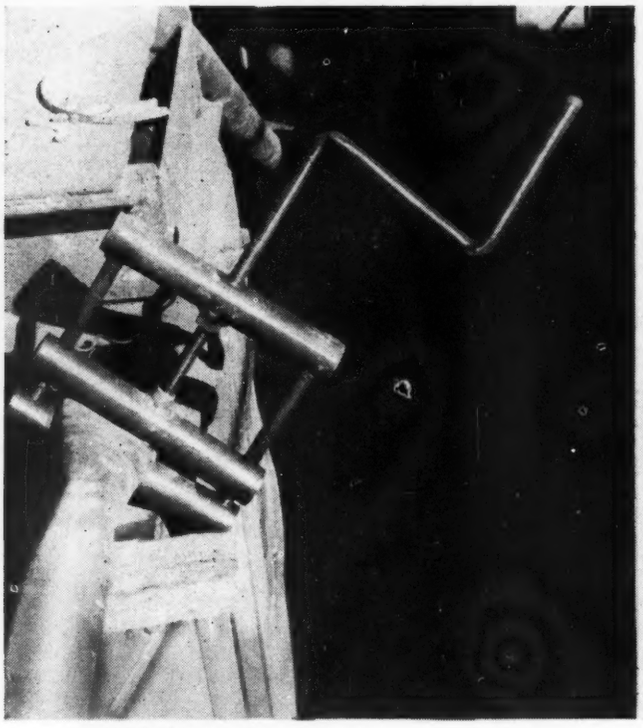
THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32

Exide Batteries of Canada, Limited, Toronto



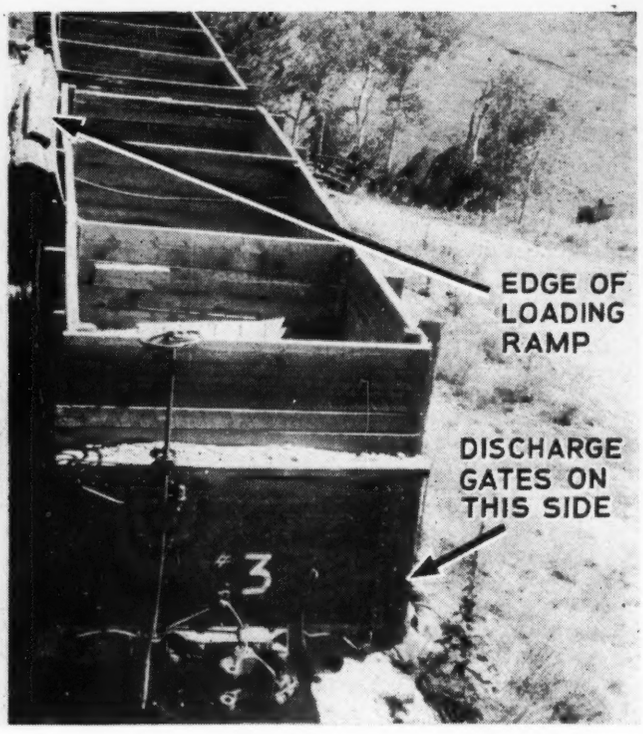
## Twin Ropes Safeguard Underground Hoist

IF ONE ROPE IS GOOD, why wouldn't two be better? This is a principle used in many building elevators for safety purposes. Here we see the same idea used in a former underground hoist installation at the Camp Bird mine near Ouray, Colorado. A divider separates the two ropes on the hoist drum, and a simple yoke on top of the cage eqalizes the tension in the ropes automatically. Ernest Sorenson is shown operating the five-cylinder air hoist which handles the rope for the 200-ft., 70-deg., incline shaft. Andrew Bassett, mine foreman, who installed the double-rope system, is shown on top of the mine cage.



## Shop-Built Pinch Valve For Corrosive Fluids

THIS SHOP-BUILT PINCH VALVE was used to control or stop the flow of corrosive liquids in rubber hose in a Colorado metallurgical plant. It is constructed of partially threaded sections of steel rod, and three short lengths of two-inch standard pipe. The valve can be clamped at any desired point on the hose, and removed by unscrewing two nuts attached to the side rods.




## Ore Cars Become Ore Bins At Colorado Custom Mill

OLD ORE CARS were converted into multiple-compartment bins to segregate ores from various shippers at a custom mill in Boulder County, Colo. Ore was dumped into cars from ramp at left, and drawn out from openings in side at right. A small hoist can be used to spot the cars in front of the loading ramp, and to spot the discharge gates of the bins over the mill feed line.

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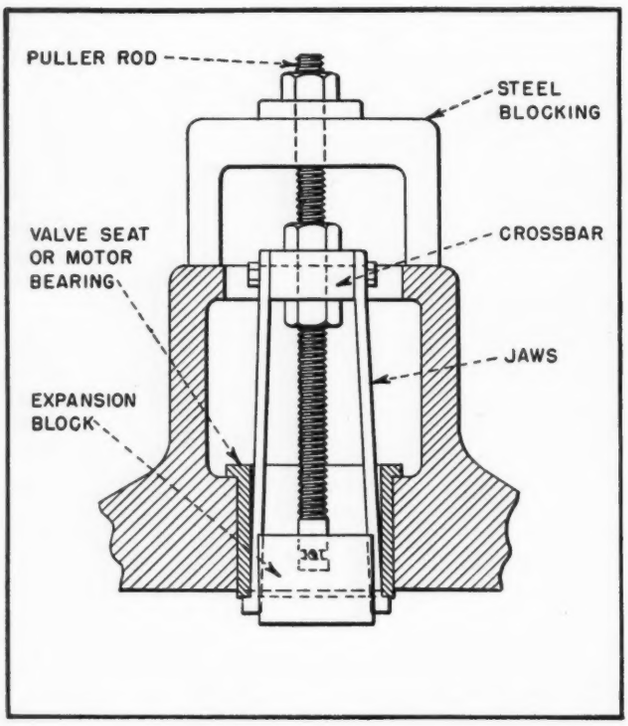
| reinforcing | Allegheny Stainless— | Bolts, Rivets |
| Structurals | sheets, plates, shapes, | Babbitt |
| Plates— | bars, tubing, etc. | Metal Working Tools |
| Inland 4-Way Floor Plate | Sheets and Strip Steel | & Machinery, etc. |

**JOSEPH T. RYERSON & SON, INC., Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles**

# RYERSON STEEL




## Valve-Seat Puller Is Easy to Operate

The outstanding features of the valve-seat puller evolved at a lead-zinc mine in central Spain, and shown in the accompanying illustration, are simplicity of construction and dependability in operation. As designed, no slipping is possible once the device is mounted in position ready for pulling. The device consists of two steel puller jaws, expansion block, crossbar, and pulling rod, all of which were made from scrap material. To place the puller in position, first remove washer and top nut, then lower center nut, unscrew middle nut until the shoulders of the puller jaws engage the bottom of the valve seat. Next raise the expansion block by lowering middle nut, and keep on until the puller jaws are pressed against the inner wall of the valve seat. When this has been done, the top nut is raised to the bottom of the crossbar and locked. The blocking is then placed in position, and the top nut is put on the pulling rod. Then, by screwing down this nut, the valve seat is pulled up and out of the casing.

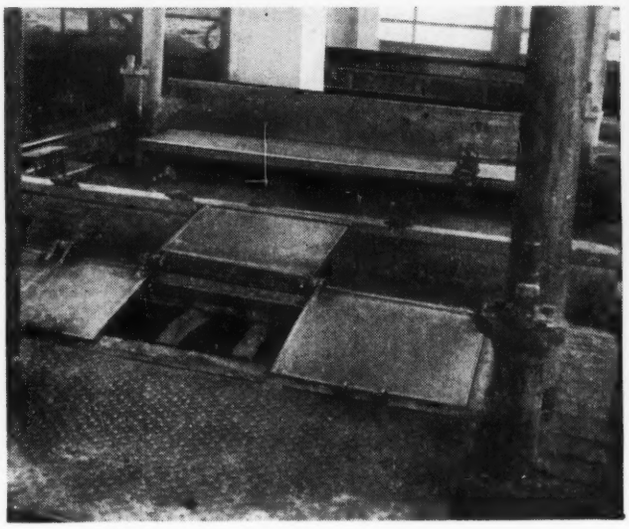
As shown in the accompanying illustration, the puller is used to pull a valve seat. It can also be used to pull motor bearings.

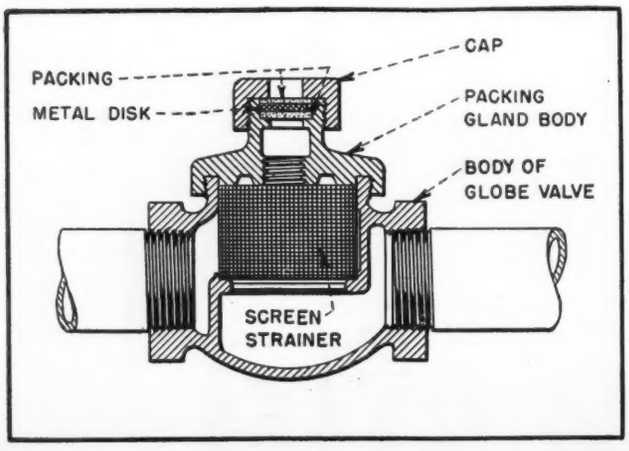
## Simplified Cleaning Increases Waste-Heat Boiler Output

Waste-heat boilers on the smelter reverberatory furnaces of the Andes Copper Mining Co., Potrerillos, Chile, were originally equipped with cleaning doors on the side of each boiler. As cleaning tools had to be inserted at right angles to the boiler tubes, it was difficult to clean dust from between the tubes.

C. P. Love, mechanical superintendent, modified these boilers by cutting doors in the roofs over each set. See illustration. Cleaning tools can now be inserted parallel with the tubes, and dust is easily and completely removed. As a result the cleaning crew has been reduced from eight to five men, and arsenic burns, previously suffered by the men, no longer occur. Cleaning is done with the boiler in full operation, yet no fumes or dust escape.

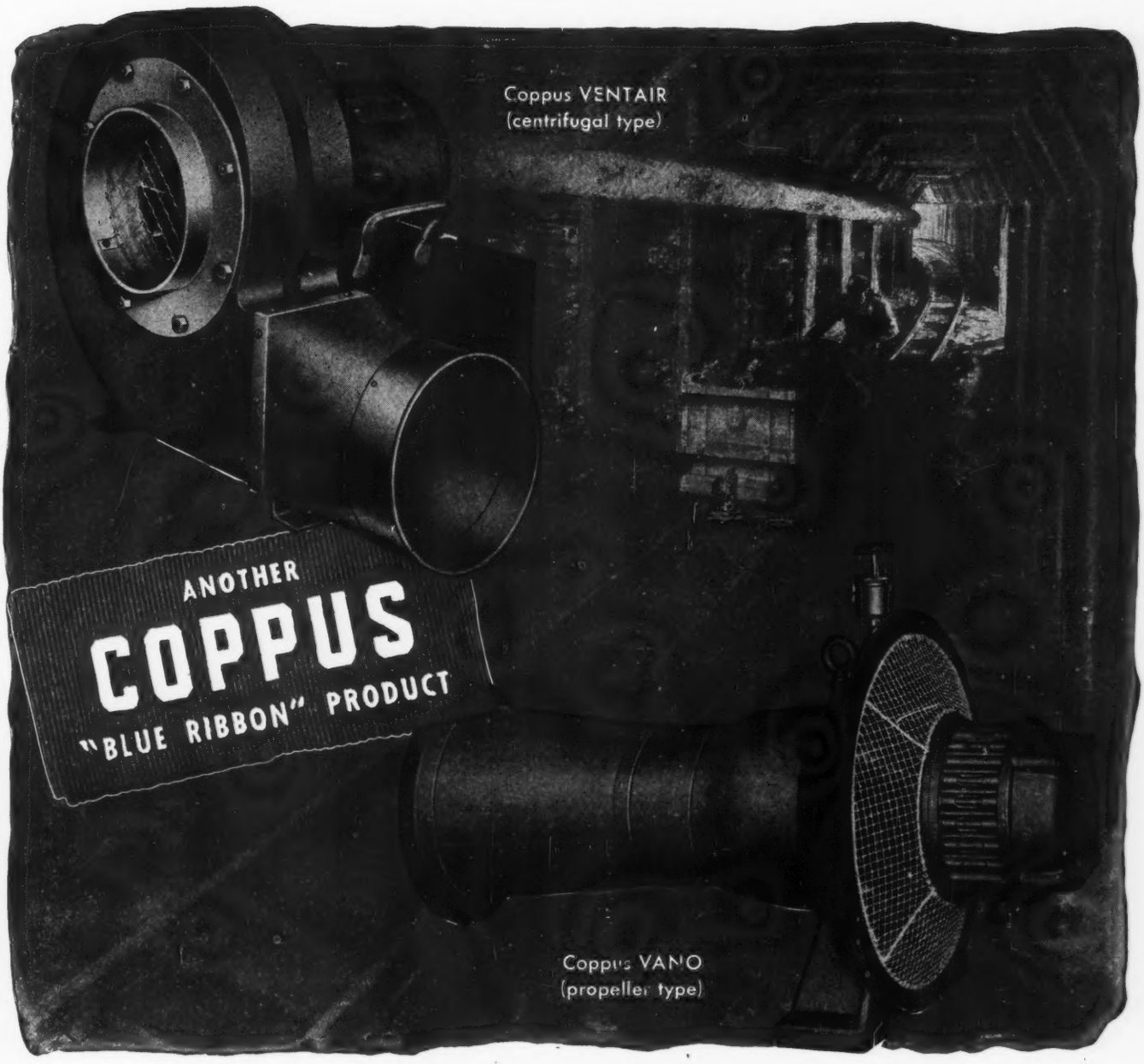
Because the boilers are now generally cleaner than before, about 28% more steam is made per pound of fuel oil burned than before the change. With four boilers operating, 7 lb. per pound of fuel oil was formerly produced; now the figure is 9 lb. of steam per pound of oil. Oil consumption has also been reduced.






## Effective Oil Strainer Made from Old Valve

When small particles of dirt clogged the burner nozzles of a drill-heating furnace at a small gold-silver mine in Central America, this practical strainer was constructed to remedy the trouble. An old valve, from which the stem and disk had been removed, was inserted into the line. The valve was fitted with a fine-mesh copper screen held in place by the valve packing-gland body as shown. The stem opening in the packing-gland body cap was closed with a brass disk and two circular pieces of leather. If desired, the disks of felt can be inserted in the screen cylinder to make the strainer more effective in removing extra fine particles.




# Two Blowers . . . One Purpose: 30 to 100% More Air

Why two totally different blower types? Because the requirements of mine ventilation fall into two entirely different categories.

For high pressures, long pipe lines, use the Coppus VENTAIR (centrifugal type). For medium pressures, shorter pipe lines, the Coppus VANO (propeller type) is best. One or the other will give you more air per given power consumption than other blowers — from 30% to 100% more. Can be used as blowers or exhausters, capacities up to 90,000 CFM, with compressed air or electric motor drive.

*Only Coppus makes both types.* And, for quick recognition, each wears the famous "Blue Ribbon," distinguishing mark of top-quality engineering, materials and performance. This blue band is your guarantee of better mine ventilation . . . Look for it.

*Representatives listed in MINING CATALOGS. Other Coppus "Blue Ribbon" products: steam turbines, gas burners, heat killers, air filters, blowers and exhausters for special purposes. See also THOMAS' REGISTER . . . Coppus Engineering Corporation, 282 Park Ave., Worcester 2, Mass.*

COPPUS ENGINEERING CORPORATION
281 Park Avenue, Worcester 2, Mass.

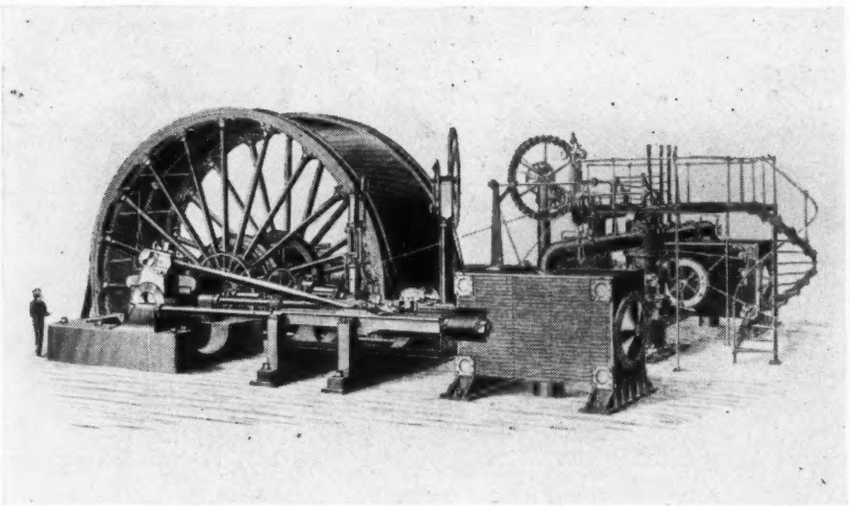
Please send: Bulletin 130.

Name.....

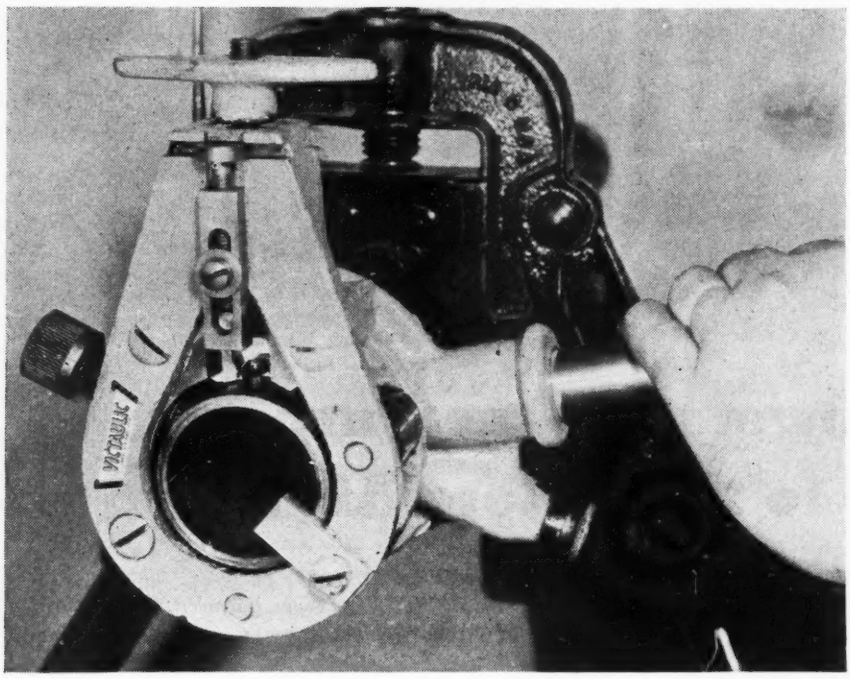
Company .....

Address.....

# EQUIPMENT NEWS



A HUNDRED YEARS of manufacturing for heavy industry will be completed in 1948 by Allis-Chalmers Manufacturing Co. The present company has grown from a combination in 1901 of the Fraser and Chalmers Co., founded in 1849, and the Edward P. Allis Co., founded in 1861. The photograph shows the steam hoist built for Tamarack Mining Co. by E. P. Allis in the 1890's. It could raise 39 three-ton cars per hour from 3,180 ft.




## For Victualic Couplings

Plain-end pipe can be easily and quickly converted for use with Victaulic couplings and fittings by means of a new portable automatic pipe groover recently announced by Victaulic Company of America, 30 Rockefeller Plaza, New York 20, N. Y.

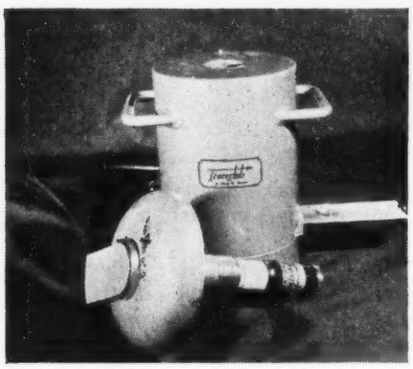
To be joined by the Victaulic coupling, pipes need no threads, but they do need grooves cut in the ends of each pipe. The new Vic-Groover does this job, producing properly-sized grooves automatically. The tool takes pipes of all sizes between ¾-in. and 4-in. For details, write Department P of the company, asking for catalog VG-47.

## Wear-Resistant Plates

Repair jobs go faster and cost less if a stock of impact and abrasion-resistant plates is available, according to American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill. Amsco austenitic nickel-manganese steel plate now comes in thicknesses from ¼-in. to 1-in. by eighths, and in the standard size of 4x12-ft. Special shapes can be cut to order.

## A 14-lb. Jackhammer

Ingersoll-Rand announces a new light-weight utility Jackhamer, a small rock drill with the features of the larger machines, but which weighs only 14 lb. Designed specifically for construction and maintenance work, the new drill, the J-10, uses standard Jack-bits, although adapters are available for using star drills. The drill has strong automatic rotation, but it can be run without the rotating pawls if desired. An oil reservoir is built into the handle. Write for Bulletin 4065, Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.



FASTER COUNTING of emissions from a large number of radioactive samples is said to be possible with the new lead-shielded sample changer and preamplifier made by Tracerlab, Inc., 55 Oliver St., Boston, Mass. For details, write the manufacturer.

(*Continued on page* 98)

# BIG YARDAGE + MORE LOADS = REAL PAYDIRT

● That's the sure-fire formula for transforming ore, coal, rock or earth into real pay dirt.

And that's the way Mack super-duty trucks are built to operate. On the toughest off-highway dump work Macks have consistently demonstrated their ability to move bigger yardage per load and more loads per hour.

They've got power in abundance! Extra margins of strength and stamina! Assured traction through Mack's exclusive Power Divider for both four and six-wheel trucks. And throughout their design special stress has been placed on ease of control, maneuverability and clear vision — thus reducing shovel delays to a minimum.

Mack trucks for off-highway service range up to the largest capacities built — gasoline or diesel — four or six wheels. Each is individually engineered for its specific job and each takes to its job only after thorough study of the proposed operation.

Our engineers will gladly advise you on the most efficient use of trucks on your particular job. Write or call your nearest Mack branch or dealer.

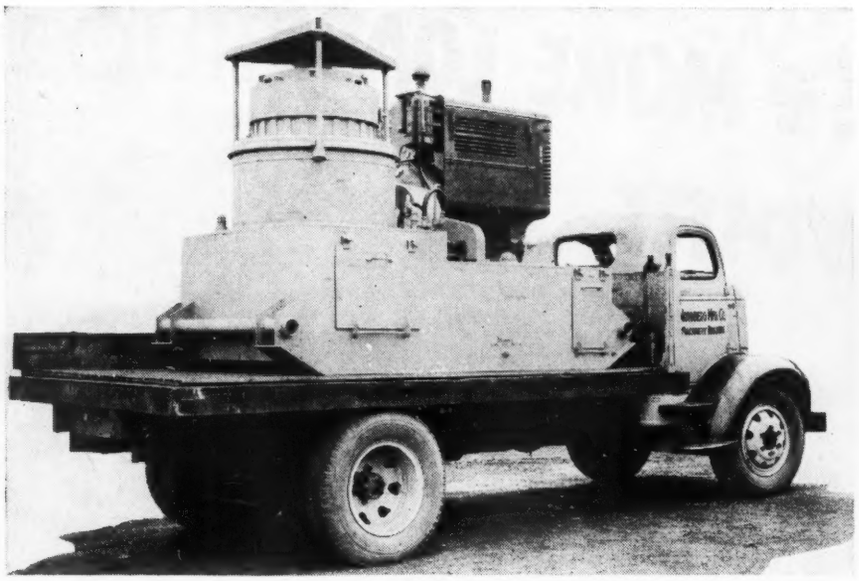
**Mack**

**since 1900, America's hardest-working truck**

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada, Mack Trucks of Canada, Ltd.

6188

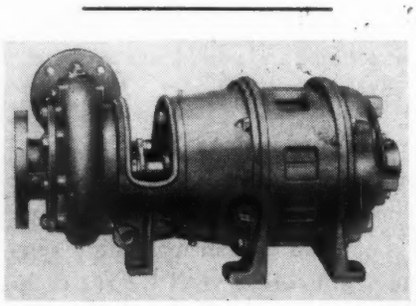
**Trucks for every purpose**



PACKAGED CONE CRUSHERS are now being built by Nordberg Manufacturing Co., Milwaukee 7, Wis. The unit shown above consists of a 22-in. Symons cone, motor, and drive mounted on a welded steel supporting base and skid. The entire unit can be carried about without dismantling the drive or the lubrication system, or even draining the oil. Capacity ranges from 20 tons per hour at 3/8-in. setting to 60 tons an hour at 1 1/2-in.

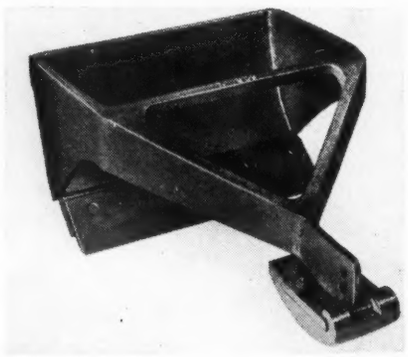
## Extra-Heavy Alloy

An alloy of tungsten, copper, and nickel that is 50% heavier than lead was announced recently by General Electric Co., Pittsfield, Mass. Called G-E Hevimet, the new alloy is designed for use as high-density material on a gamma-ray screen, but it will also serve well as a balance weight on crankshafts and similar rotating parts. It is a sintered material, but it can be made up into complex shapes by hydrogen welding. It has a density of about 17 grams per cc., a tensile strength of 85,000 to 118,000 lb. per sq. in., and a Rockwell "C" scale hardness of 30 to 40.

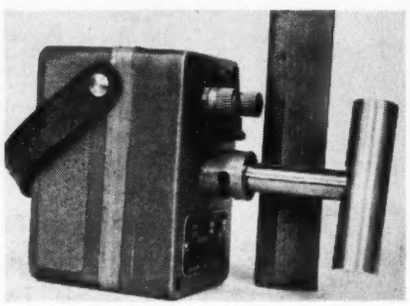


## Close-Coupled Pump

Pump impeller and motor are mounted on a single shaft in the new line of Gould "Close-Cupld" centrifugal pumps. The single-shaft construction eliminates a coupling and makes it possible to protect the shaft by a full-length sleeve. Another new feature is a machined stuffing box that permits using either die-formed semi-metallic packing or a mechanical seal. The new pump comes in 17 sizes with capacities up to 2,000 g.p.m.

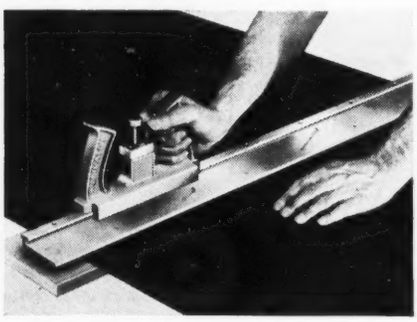


ONE-PIECE cast alloy-steel scraper with renewable blade and shoe is heavy enough to dig, has no bolts or rivets in the body. Made by Cate Equipment Co., 49 East 9th South, Salt Lake City, Utah, this scraper comes in two sizes; for 5 to 6 1/2-hp. hoists and for 7 1/2 to 15-hp. hoists.



## Blasting Magneto

Blasting of one to ten shots can be done easily and safely with the new small magneto now being made by Breeze Corporations, Inc., Newark, N. J. Particularly designed for coal mine service, the 10-shot magneto is the only such unit approved by the U. S. Bureau of Mines. Weighing only 4 1/2 lb., the blaster has no commutator, brushes, or rotor windings. Discharge is automatically limited to between 12 and 30 milliseconds.

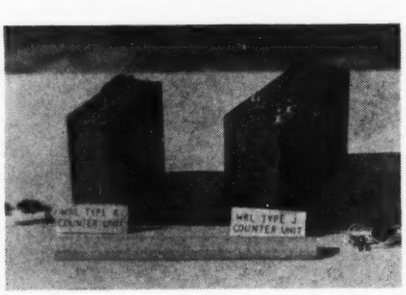


CUTTING LARGE BELTS, up to 60 in. wide, is said to be easy with this new belt cutter made by Flexible Steel Lacing Co., 4607 Lexington St., Chicago 44, Ill.

## A. C. Supply; D. C. Drive

Westinghouse Electric Corporation has developed at least two ways of operating d.c. motors on a.c. lines, using rectifiers. In one way, the intervening link is the selenium type of dry-disk rectifier. In the other, a controlled tube-type rectifier is used. The selenium rectifier scheme is simpler, but it lacks the wide speed range and the close control of the tube type.

Anyone interested in applying automatic control to various milling operations would do well to investigate both techniques. Such control usually calls for a variable-speed motor somewhere in the circuit, and these devices are designed for just that purpose.




## Low-Cost Geiger Counters

Two lightweight, low-cost gamma-ray counters were announced recently by Western Radiation Laboratory, 1107 24th St., Los Angeles 7, Calif. Both are designed for field use.

The larger unit, the type J, offers three methods of indication: A built-in amplifying and loudspeaker system produces clicks audible at a distance; a neon lamp flashes at the same time; a headphone can also be used in noisy locations. The unit weighs 4 7/8 lb. It

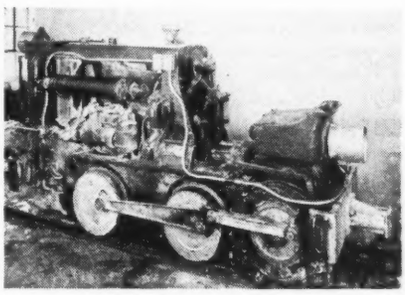
is priced at $140, f.o.b. Los Angeles.

The smaller unit, type K, has no amplifier or indicating lamp, therefore the headphone must be used to pick up the clicks that indicate gamma-ray discharge. Weighing 3 lb., the unit measures 5¾x6½x2-in. Price is $95, f.o.b. Los Angeles.

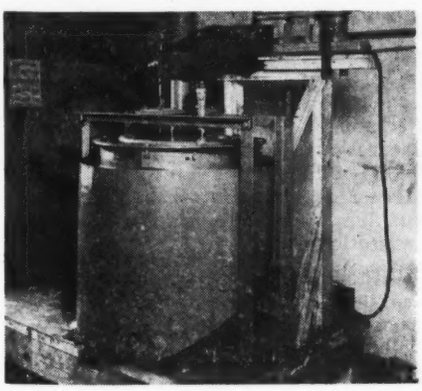
## Smooth Fluid Drive

Size of electric drive motor on a job depends on the running horsepower required, not on starting demand, if the new Link-Belt electrofluid drive is used. The unit consists of a general-purpose a.c. induction motor and a fluid coupling. It can be connected to the driven machine by any conventional method, or it can be direct-connected. The unit comes in sizes up to 20 hp.

Not only is starting easier, but shock loads from the driven side do not meet the solid resistance of the motor and therefore cause no damage. Shear pins are eliminated. The electrofluid drive is suggested for conveyors, compressors, ball mills, crushers, and many other types of equipment. Write Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill., for a copy of booklet No. 2085.



NEW EXHAUST CONDITIONER is now a part of mine haulage diesel locomotives made by The Ruth Co., Denver 2, Colo.



## Fine-Size Separator

Magnetic material of fine sizes in a dilute pulp can be recovered by a new magnetic separator now being built by Magnetic Engineering and Manufacturing Co., Clifton, N. J. The new


*North • East • South • West . . . It's Schramm*

*. . . doing jobs like these in Your Field*

At almost every turn you need compressed air!

The check list (at right) indicates some of the many compressed air jobs to be done, all of which are accomplished easily, quickly and economically with Schramm Air Compressors.

Here's *why* you profit, as others have, by using Schramm: they're compact, lightweight, easy to start; built for rugged jobs, to provide a continuous flow of air.

Important features include 100% water cooled; mechanical intake valve; forced feed lubrication and easy, electric push-button starting.

Performance everywhere has proved Schramm Air Compressors can do any compressed air job you require. Write today for list of models and sizes.

- Rock Drilling
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- Spray Painting
- Sand Blasting
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- Pneumatic Grease Guns
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- Spraying Metal
- Spraying Enamel
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- Operating Air Hoists

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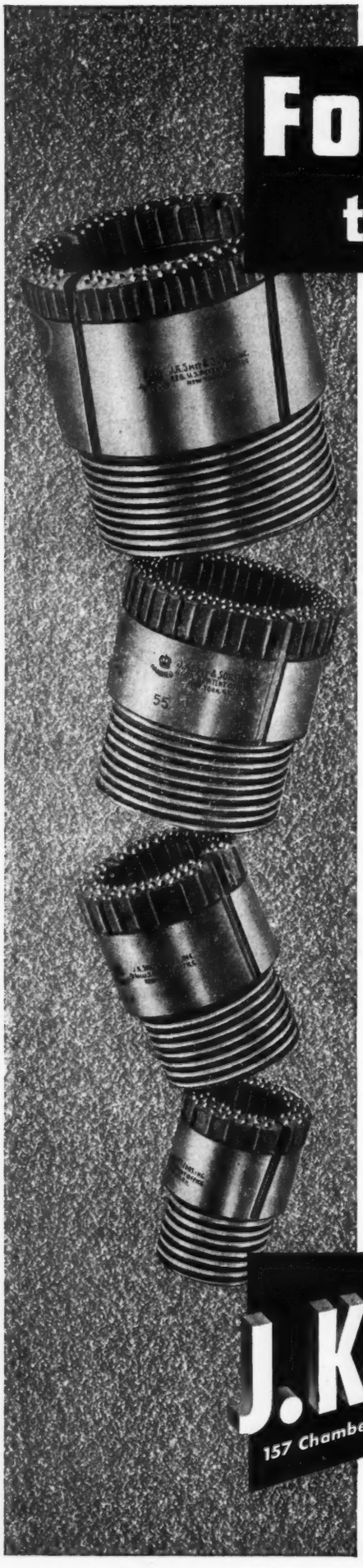

# Footage that counts

**For speed, footage and high diamond salvage, choose the JKS HARDHED 55 Tungsten-Carbide Matrix Diamond Bit.**

**Choose HARDHED 55 Core Bits for drilling in broken, irregular or coarse-grained formations. The tough, powdered metal matrix resists the action of hard and abrasive cuttings. This free-cutting bit gives faster than normal drilling speed.**

**FEATURES OF HARDHED 55**

1. Select quality diamonds
2. Extremely hard, tough matrix
3. Matrix gives maximum diamond support
4. Scientific diamond pattern
5. Careful diamond setting

***Result:***

***Lowered drilling costs per foot.***

*Catalog on request.*

**J. K. SMIT & SONS**

157 Chambers St., New York 7, N.Y. 129 Adelaide St., Toronto, Ont.


machine is said by the manufacturer to be radically different from any other type of magnetic separator used heretofore.

A cone-type separator, the new Memco unit will concentrate finely-divided magnetic ores; it will also remove magnetic particles from cutting oils and do other similar jobs. Its operation is continuous; previous machines for this service could run only intermittently.

Material to be separated, usually at a dilution of three or more parts of liquid to one of solids, is fed into the top of the machine. The separation takes place inside, and magnetic material discharges from one outlet, non-magnetic from the other. A laboratory machine is available for test work.

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## INDUSTRIAL NOTES

**W. G. Frome** has been elected vice president of **Atlas Powder Co.**, Wilmington, Del.

Western-Knapp Engineering Division of **Western Machinery Co.**, 760 Folsom St., San Francisco, Calif., has been awarded a $1,500,000 contract to build two ore-dressing plants for the Republic of Turkey.

**Syntron Company**, Homer City, Pa., has purchased the former H. K. Porter shell plant at Blairsville, Pa., where it plans to manufacture its heavy-duty vibrating feeders and conveying equipment.

**I-T-E Circuit Breaker Co.**, Philadelphia, Pa., has acquired the **Railway & Industrial Engineering Co.**, Greensburg, Pa.

**Timken Roller Bearing Co.** has purchased the eight-acre site and taken over all construction for the new rock bit plant at Colorado Springs, Colo. **Frank M. Givin**, general foreman of the company's Mt. Vernon plant, will manage the new unit. Output will be 10,000 rock bits a day.

**Allis-Chalmers Mfg. Co.** announces the following appointments: **A. J. Jorgensen** as chief mechanical engineer and **F. R. Gruner** as mechanical research and development engineer in the basic industries division; **B. H. Puerner** as manager of the division's crushing, cement, and mining machinery section.

**Arthur G. Lambert** has been elected vice president and manager of the export division of **Atlas Steels, Ltd.**, Welland, Canada.

**A. H. Wardwell** has been appointed director of raw materials, a newly created post, for **American Steel & Wire Co.**, a subsidiary of **U. S. Steel Co.**

**Harry E. Orr**, formerly general manager of operations of the **Vanadium Corporation of America**, has

been appointed assistant vice president and manager of district sales of the company.

**Walter H. Wragge,** rock bit service engineer for **Timken Roller Bearing Co.,** died suddenly on November 19 in Metaline Falls, Washington. He had been with the Timken company for 25 years, and since 1936 had represented the rock bit division of the company in Mexico, Canada, and the Western States.

**Charles R. Moffatt,** director of advertising of the **United States Steel Corporation of Delaware,** has retired after 40 years continuous service with the company.

**Harry S. Black,** senior vice-president and a member of the board of directors of **Ohio Brass Co.,** died suddenly at his home in Mansfield, Ohio, October 9, after a brief illness.

**B. H. Johns** has been appointed manager of the mining and contractors' tools sales division of **Independent Pneumatic Tool Co.,** Chicago, Ill.

## BULLETINS

**Rock-Bit Forge.** Complete information on the DFC oil or gas-fired rock-bit forge may be obtained from Denver Fire Clay Co., Denver, Colo.

**Rectangular Magnets.** A new 12-page catalog describing rectangular double-gap electromagnets for tramp iron protection, and for various other industrial uses, is available from Dings Magnetic Separator Co., 4740 McGeogh Ave., Milwaukee 14, Wis.

**Aftercoolers.** The benefits, principles, and applications of aftercooling in compressed air work, and a description of a line of type PL and M aftercoolers appear in a new 16-page bulletin recently published by Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

**Electric Plants.** A new 16-page catalog covering their complete line of electric generating plants is offered by D. W. Onan & Sons, Inc., Minneapolis 5, Minn.

**Rubber Boots.** A new catalog section on its line of industrial rubber footwear has been published by B. F. Goodrich Co., Akron, Ohio.

**Building Maintenance.** The 15 most urgent building maintenance problems are illustrated in an informative folder recently published by the Stonhard Co., 809 Terminal Commerce Bldg., Philadelphia 8, Pa.

**Wrenches.** A 36-page catalog covering its line of new, or reinstated, socket and end wrenches is now available from Blackhawk Mfg. Co., Milwaukee 1, Wis.

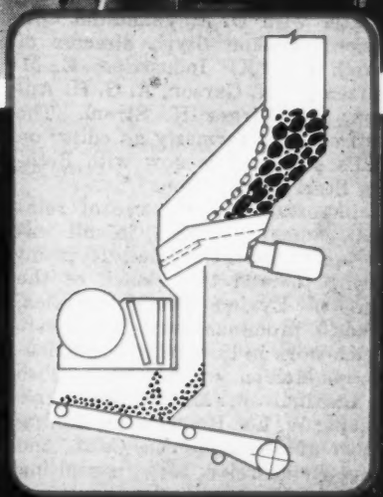
**Recording Instruments.** Measuring recording, indicating, and controlling functions of the Wleelco Capacilog are discussed in a new instruments Bulletin recently published by Wheelco Instruments Co., 847 West Harrison St. Chicago 7, Ill.

**Packings.** Data on super-heat compressed asbestos sheet packing, and on other types of rubber, cloth, and Koroseal packings, are given in a new catalog section recently announced by B. F. Goodrich Co., Akron, Ohio.

**Hard Alloy.** Engineering properties and applications of Ni-resist, corrosion-resistant nickel alloy, are given in a new 36-page bulletin offered by International Nickel Co., 67 Wall St., New York 5, N. Y.

**Metal Tubing Layout.** An authoritative handbook on selection, sizing, layout, and installation of metal tubing circuits has just been published by Parker Appliance Co., Cleveland, Ohio.

(*Continued on page* 132)



JEFFREY-TRAYLOR

*Electric Vibrating*

GRIZZLY FEEDER

BY-PASSES FINES AHEAD OF CRUSHERS—PROTECTS BELT WITH CUSHION OF FINES . . . SAVES WEAR ON CRUSHER PARTS

Electric Vibrating Feeders are often equipped with a grizzly section at the discharge end for combining feed control with a rough, coarse sizing operation. They are used extensively to by-pass fines ahead of primary and secondary crushers and picking belts to scalp out large pieces ahead of screens—and to protect belt conveyors by bedding with fines thus providing a cushion for large jagged lumps. This type of unit provides a feeder and non-clogging grizzly in a single unit. It saves installation and operating expense as well as conserving headroom. Consult Jeffrey Engineers on equipment best suited to your Metal Mine needs.

Installation shown is a Jeffrey-Traylor electric vibrating grizzly feeder ahead of primary crusher equipped with tapered steel bars. Tonnage 600 T.P.H.—4′ x 0 cubes.

CONVEYORS • BUCKET ELEVATORS
FEEDERS • CAR PULLERS • CRUSHERS
CHAINS AND TRANSMISSION MACHINERY

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Boston 16 · Cleveland 13 · Houston 5 · New York 7 · Scranton 3
Buffalo 2 · Denver 2 · Huntington 19 · Philadelphia 3 · Salt Lake City 1

# NEW BOOKS

**SAGA IN STEEL AND CONCRETE.** Norwegian Engineers in America. By Kenneth Bjork. Norwegian-American Historical Association, Northfield, Minnesota. Pp. 504. Price $4.

The part played by Norwegian engineers in the development of American technology is interestingly described by Mr. Bjork, who is professor of history at St. Olaf College. Among the metallurgical men whose achievements are dealt with are E. A. Cappelen - Smith, of Guggenheim Brothers; Anton M. Gröningsaeter, consultant with Falconbridge Nickel Mines, Ltd.; O. H. Lorange, once associated with Primus Chemical Co. and later with U. S. Vanadium Corporation; Haakon Styri, director of research for SKF Industries; E. M. Arentzen, H. N. Garson, A. G. H. Anderson, and Birger H. Strom. The last-named was formerly an editor on E&MJ's staff and is now with Bethlehem Steel Corporation.

So important has the use of reinforced concrete become in all engineering construction that it is interesting to read this sketch of the career of Eyvind Lee-Heidenreich, who had a prominent part in pioneering such work in this country, particularly in Monier constructions. Two sons continue in Mr. Heidenreich's footsteps: W. Lee-Heidenreich, mining engineer of Santa Monica, Calif., and E. Lee-Heidenreich, Jr., consulting engineer of Newburgh, New York.

**DOING IMPORT AND EXPORT BUSINESS.** Published by Foreign Commerce Department of the Chamber of Commerce of the United States, Washington 6, D.C. Pp. 140. Price, $1.00.

Made available in this booklet is a concise and systematic treatment of the principles, practices and problems of importing and exporting. Its publishers intended it as a practical introductory guide for manufacturers, wholesalers, or retailers without previous foreign trade experience. Complete bibliographies of other reference works are included.

**COMPRESSED AIR HANDBOOK.** Published by Compressed Air and Gas Institute, New York, N. Y. Pp. 400. Price, in U. S. A., $3.00; elsewhere, $3.50.

This handbook was published as a reference text on applications, installation, operation, and maintenance of compressing equipment and air-operated tools of all kinds. In addition to making available much new data not heretofore published in a single volume, the book contains, in revised form, all of the standard reference material formerly published as "Trade Standards." Definitions, test standards, and numerous basic tables and formulas are included.

The object in preparing the work was to provide reference data that would meet technical and engineering needs, and also serve the layman and the student with information on the versatility and utility of compressed air power.

The handbook represents the collective knowledge, experience, and thought of the 19 member companies of the Compressed Air and Gas Institute. It was compiled over a two-year period by the Institute's educational and technical committees.

**ROCKS AND ROCK MINERALS.** By Louis V. Pirsson and Adolph Knopf; third edition, revised; John Wiley & Sons, Inc., New York. Pp. 349. Price, $4.00.

The third edition of this widely used text book is the first revision since 1925. Professor Knopf has done a comprehensive job of bringing the work up to date, of condensing, and of reconciling the treatment to the tendency of geologists to adhere to microscopic rather than megascopic terminology.

**THE MINERAL RESOURCES OF TANGANYIKA TERRITORY.** Published by Department of Lands and Mines, Geological Division, Dodoma, Tanganyika Territory. Third edition, 1946. Pp. 171. Three maps. Price, 15s.

In view of the recent development of a promising lead orebody in Tanganyika Territory, this survey of the mineral resources of that region was received with considerable interest. Certainly, on the evidence of this book, the Territory must be regarded as a rich mineral region.

Gold has for several years been the chief mineral product of the country, making up about 86% of the total value produced. About one-third of this gold comes from placer operations. Value of gold mined reached a peak in 1941 of £1,207,028, and despite some decline since the war, value of gold produced in the last seven years exceeds that produced during the preceding 15 years. Between 1923 and 1944, gold to the value of £10,000,000 was mined. Geology of the three main goldfields in Tanganyika is given here in some detail.

The region in which a lead mine is now under development by Uruwira Minerals is discussed. Enough information has been gathered to outline a most interesting mineral district. The geology of areas in which tin, diamonds, mica, and tungsten are mined is also discussed.

Probably the most interesting sections of the book are those given to discussing minerals that have been found in Tanganyika, but have not yet been mined. This includes a tremendous range of mineral products for so small a country.

Of most interest, perhaps, is a small section on pitchblende. The book reports that no important deposits are known, but quite large crystals of pitchblende have been found in the mica-pegmatite veins of the Uluguru Mountains. These crystals have been found to contain as much as 89% uranium oxide. The radioactivity of these crystals was reported to exceed that of the crystals found at Joachimstal in Europe by about 20%. Back in 1914 it was reported that crystals of pitchblende weighing several kilograms had been found among the mica plates of one of the quarries. It was reported further that the uranium-thorium and helium-bearing plumboniobite, occasionally found in the quarries, is also radioactive. No more recent data are given.

**LE DIAMANT DANS LE MOND.** By Pierre Gemme. Brussels, 1947.

This 82-page booklet consists of two equal parts, a short treatise on the diamond and a description of the Belgian Congo diamond mining industry.

The first part is a fair summary of the industry, although marred by minor inaccuracies; the second part is an excellent description of one of the world's important mining regions. The Kasai mines of Forminiere are first described and then the exploitations of the Beceka, which furnish some 75% of the world's industrial diamonds.

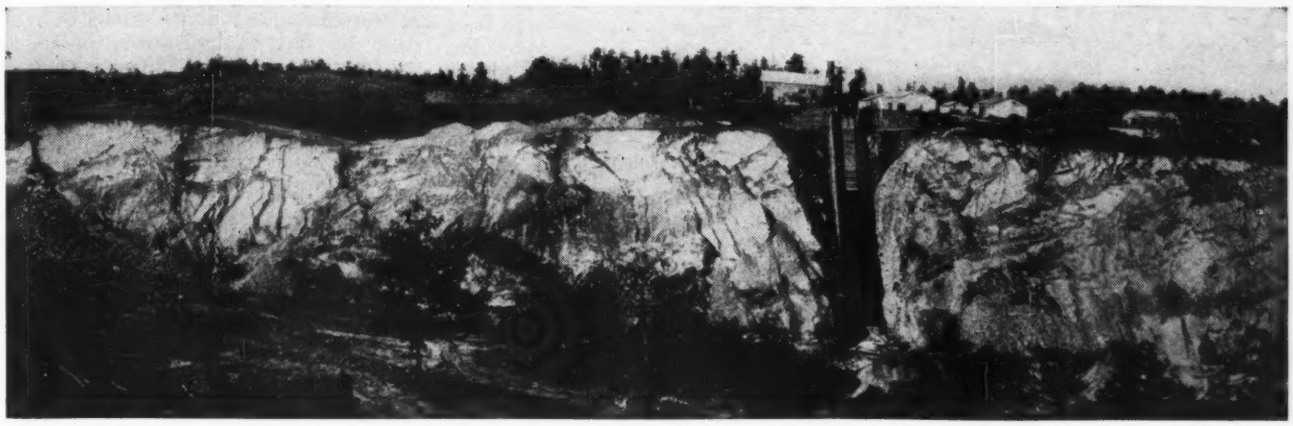
S. H. Ball

**CLOUD BY DAY.** By Muriel Early Sheppard. Published by the University of North Carolina Press, Chapel Hill, N. C. Pp. 266. Price, $4.25.

This is a book about Pennsylvania's Coke Region, the area from which the furnaces around Pittsburgh get their fuel. It is not a novel, although it reads almost as swiftly as one. It is simply a history of what has happened in the district to make it what it is today, a region of combined

(*Continued on page* 136)

# REGIONAL NEWS



AT MAGNET COVE, Arkansas, the Magnet Cove Barium Co. is preparing for underground mining after carrying operations nearly to the limit of economic open-pit extraction. A hoisting slot has been constructed in the north wall of the pit, and a mine surface plant has been installed. The company's product goes entirely into the oil-well drilling mud field.

## ILLINOIS-KENTUCKY

### New Fluorspar-lead vein discovered —Alco Lead Co. leases Mineral Ridge property

★A new 5-ft. vein of fluorspar-lead ore was recently discovered by J. S. Baldwin, independent core-driller operating in the Kentucky-Illinois district, following exploratory work on property in Crittenden County, Ky., near the Ohio River border and opposite Cave-in-Rock, Ill. Baldwin leased approximately 400 acres, known as the Ainsworth property, diamond-drilled and cut four veins, and then sank a shaft and encountered the 5-ft. vein at a depth of 20 ft. The acreage was leased from J. S. Ainsworth, of Marion, Ky.

★Alco Lead Co. has leased the Mineral Ridge fluorspar mine, in the Kentucky district near Salem, from Ozark-Mahoning Co., which suspended its operations at the property about a month ago. Alco began operations in November and plans early installation of a Western Knapp Mobile Mill, Heavy Media separation plant. Direction of Alco's property in the Illinois district has been assumed by Don Randall as Works Manager, succeeding Philip Emrath who resigned to do engineering consultant work.

★Mine and mill employees of Inland Steel Co., fluorspar division, of Rosiclare, Ill., who went out on a strike November 11, voluntarily returned to work Nov. 21 after the management's denial of their request for a wage increase. Approximately 75% of the employees walked out. Only the company's Rosiclare plant was affected. Demands included a pay increase of 12½ c. per hour, or a 7c. per hour increase plus six paid holidays and insurance premium payments. No changes in present schedules were granted. On November 20 the local union committee requested a return to work, according to Paul E. Richards, Inland's superintendent.

## GEORGIA

★Mineral output of Georgia in 1946 was valued at $24,000,000, compared with the previous peak of $21,000,000. Clay production is expected to set a new record this year.

★Organization of the Appalachian Minerals Co. to work feldspar deposits at Monticello, Georgia, has been announced. L. P. Warriner is president; B. C. Burgess, vice president and general manager; and H. E. Uhland, superintendent. Mr. Burgess was formerly with the United Feldspar and Minerals Corporation. During the war he was engaged on mica projects for the government. The new company is producing 2,000 tons of feldspar a month and grinding to 20 mesh. It is planned to do fine grinding. A plant is under construction.

## ARKANSAS

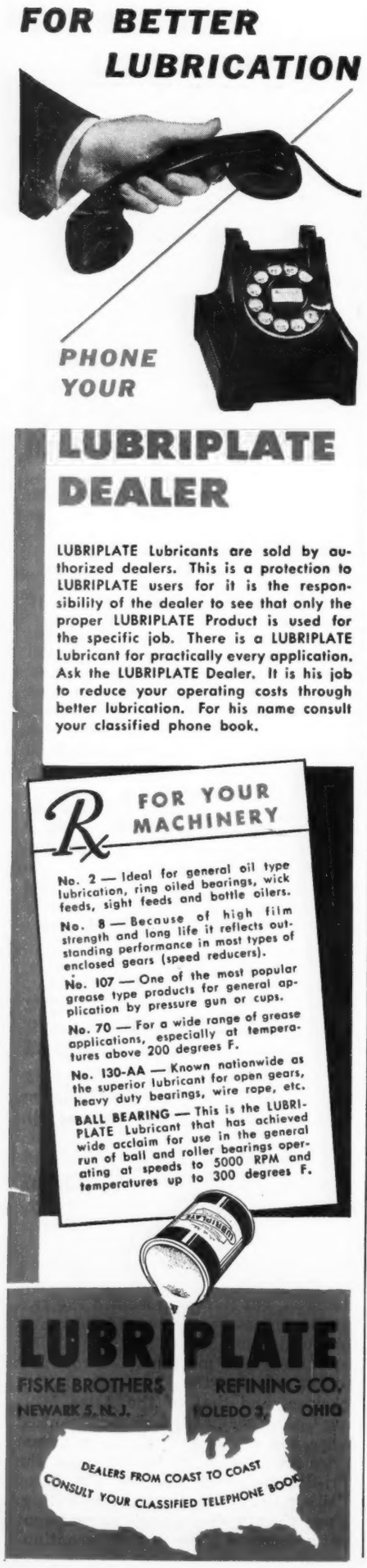
★The Lucky Dog mine, in Searcy County, has been reopened by Dr. W. M. Owen and associates, of Mountain Home. Installation of a 100-ton mill has been completed. The orebody is being worked through a 100-ft. tunnel. A 40-ft. exposure of a six-foot vein is reported to yield assays of 15% zinc.

★The U. S. Bureau of Mines will soon make a study of the possibility of stockpiling low-grade bauxite ore as a conservation measure. Harold B. Foxhall, Arkansas Resources & Development Commission, has been notified by Capt. A. M. Granum, executive secretary of the munitions board, that the proposed project has been turned over to the Bureau for investigation. Much metal-grade bauxite is being lost through the mining of higher grade abrasive and chemical ores for which there is a ready market, according to Mr. Foxhall.

## TRI-STATE

### Tailing mills being dismantled— "High-grading" sustains present diminishing production

★General Steel Products Co. of Joplin and the Cardin Electric Co. were reported to have purchased the Ottawa tailings retreatment plant of Tri-State Zinc, Inc. Division of the acquisition or the terms of sale were not announced, but it was presumed the two purchasing companies would dismantle the mill and dispose of the milling equipment and machinery. Two other tailing plants—the C., G. & C. Co., Skelton, and that of the Atlas Milling Co.—already are being dismantled since the expiration of the premium price plan. Only two tailing mills, the Tri-State Sooner and the Big Chief Tailing Co. plant, now are operating. More than a dozen such retreatment units operated prior to the discontinu-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## Tri-State (*Continued*)

ance of federal subsidies for marginal production. Tailing mill output, consequently, has been reduced approximately 500 tons weekly.

★How Tri-State producers have been able to maintain production at roughly 50% of normal without the aid of premiums was explained by J. V. Reynolds, manager, United Zinc Smelting Corporation, in a letter to the Tri-State Zinc & Lead Ore Producers Association which read in part as follows:

"A very sizable portion of present production is of the clean-up variety in which many mines are being 'high-graded' and 'sludged-out' before being abandoned, and this type of production will quickly diminish. Most of the small independent producers on the active list are either actually operating at a loss, or on a very narrow margin of profit, by 'high-grading' their mines and rapidly depleting their marketable ore reserves in the hope that they will be able to keep their organizations and properties intact until congress considers relief for the mining industry. In many cases leased properties have to be operated to avoid forfeiture by the landowners. This group is sticking it out as long as possible; but if price relief is not obtained by spring, much of this production will fall by the wayside. As an additional hazard, any weakness which might develop in the metal market would completely shut down this group. The largest section of active production is that of the few major producers still active in the field. It is a very unhealthy condition, but it is also a fact that the great bulk of their production is being carried on at an actual operating loss which they can carry only because of their profits on processing and sale of refined metal in its various forms. This condition, without a renewal of government subsidies, can only become more critical until these major producers are forced to gradually curtail their Tri-State production and look to cheaper foreign metal for their operation."

## IRON COUNTRY

### Bristol mine to be reopened by Inland Steel — Greenwood mine deepens shaft 200 ft.

★Announcement has been made by Vice Pres. C. B. Randall of Inland Steel Co. that the Bristol mine, Crystal Falls, Mich., will be reopened by them in the near future. It was purchased from the Oglebay Norton Co. in 1938 and has not operated since 1930. The ore is of a manganese grade. P. D. Pearson, superintendent of the Inland's Sherwood mine at Iron River will be in charge.

★A letter by D. B. Gillies, president of Lake Superior Tax Association, to iron ore operators calls attention to the urgent need of scrap at the furnaces, and efforts are being made to correct this trouble. On the Marquette Range the Cleveland Cliffs Iron Co. has scrapped four of their steam shovels and will dispose of the others as fast as electric and diesel operated shovels can be secured to replace the steam units for stockpile loading.

★At the Greenwood mine, Ishpeming, Mich., operated by Inland Steel Co., the shaft will be sunk another 200 ft. Sinking is now under way. This mine is the only producer of hard hematite ore owned by Inland on Lake Superior. Its production for the last ten years has averaged close to 250,000 tons. The mine is now 1,700 ft. deep.

★York mine, Nashwauk, Minn., concluded its operations this season with the exhaustion of the ore in the mine. The mine has been operated since 1917 by the York Mining Co., and has been a small but steady producer to the present time. Butler Brothers, Cooley, Minn., have purchased all the mining equipment including the concentrating plant from the York Mining Co.

★E. W. Coons Co., Inc., has concluded its operation at the Vivian mine north of Aurora, Minn., with the exhaustion of the property. This property was first opened up in 1912 by the Oliver Iron Mining Co. and produced a small tonnage for three years. It was taken over by the Coons company in 1945.

## MICHIGAN

### Calumet & Hecla starts up new furnace for smelting secondary copper

★A new furnace has been placed in service in Calumet & Hecla Consolidated's smelting plant. The bricks used in the furnace proper are composed largely of magnesite and chrome and contain no silica. The furnace will be used for smelting secondary copper.

The arch of the furnace is of basic material, making it possible to drive the furnace much harder than the average because the arch can withstand high temperatures, also any complications from "rabbling," or the blowing of air into the bath to remove foreign materials. The new furnace is fired by two burners, using pulverized coal. It also is equipped with a recuperator, doing away with the waste-heat boiler. To utilize some of the heat in the flue gases, the recuperator preheats the air going to the burners. The operation raises the flame temperature of the burners by several hundred degrees and decreases the coal consumption from 10 to 15%.

Capacity of the furnace is 200,000

(*Continued on page* 106)

## Letters *(Continued)*

thirties with the increase in gold prices and has revived since the war with silver-bearing ores the objective.

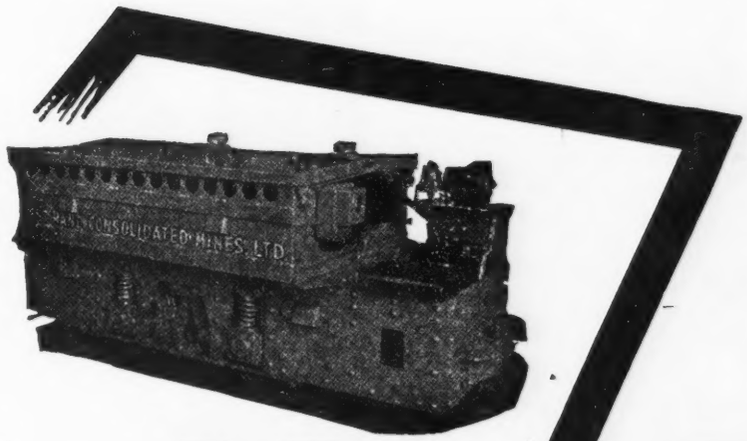
The reopening of abandoned and caved workings brings up the question of timbering, generally the most costly part of the old workings' operation. In many of the old drifts I have examined, square tunnel sets were used with both cap and post framed. Invariably I found caps in much better condition than posts and where caves were encountered, often the post shoulder had rotted, allowing the side pressure to force the post from under the cap. The common tunnel sets with all framing on the cap and the posts stood with sufficient batter so that, when blocked down, it was impossible for them to be forced in. They are stronger, will last longer, and are cheaper, as much of the framing cost is eliminated.

In catching up caved drifts where spiling is necessary and the face is running, requiring additional timbering to stand posts, I have found boom sets safer and cheaper than breast boards. The angle of repose of the running ground reaches from the point of the spiling to the tunnel floor at the posts of the last set, and use of breast boarding to hold the face under the spiling points is a common practice and will allow the set to be stood. However, breast boarding is slow, costly and has resulted in many accidents. A face movement, while floor hitches were being cleaned out has covered men and caused serious and sometimes fatal injury to workers; and even when no one is caught by the ground, the breast boarding must all be redone.

With a boom set, two posts are stood in the drift against the posts of the last set with space between the top of the posts and the cap, allowing stringers to be run over them under the point of the spiling. The stringers are tailed under the second cap from the face, which holds them securely; the cap for the set ahead is placed on the stringers and girted; then the bridge is placed and blocked to the spiling. The cap and bridge will hold the muck as a breast board under the spiling points and by decreasing the vertical height of the face, lessen the run of ground in the drift. Then, by driving a second set of spiling from the boom-held cap, the toe of the cave will be advanced so that the posts may be easily stood under the cap held by the booms. If the ground is so heavy that it puts too much strain on the booms, which are rail steel or timber, step-down posts may be used as temporary support until the floor is reached and permanent posts are stood; then the booms can be held up and shoved forward for a repetition of the work.

B. Y. THORP

*Seattle, Washington*
Sept. 8, 1947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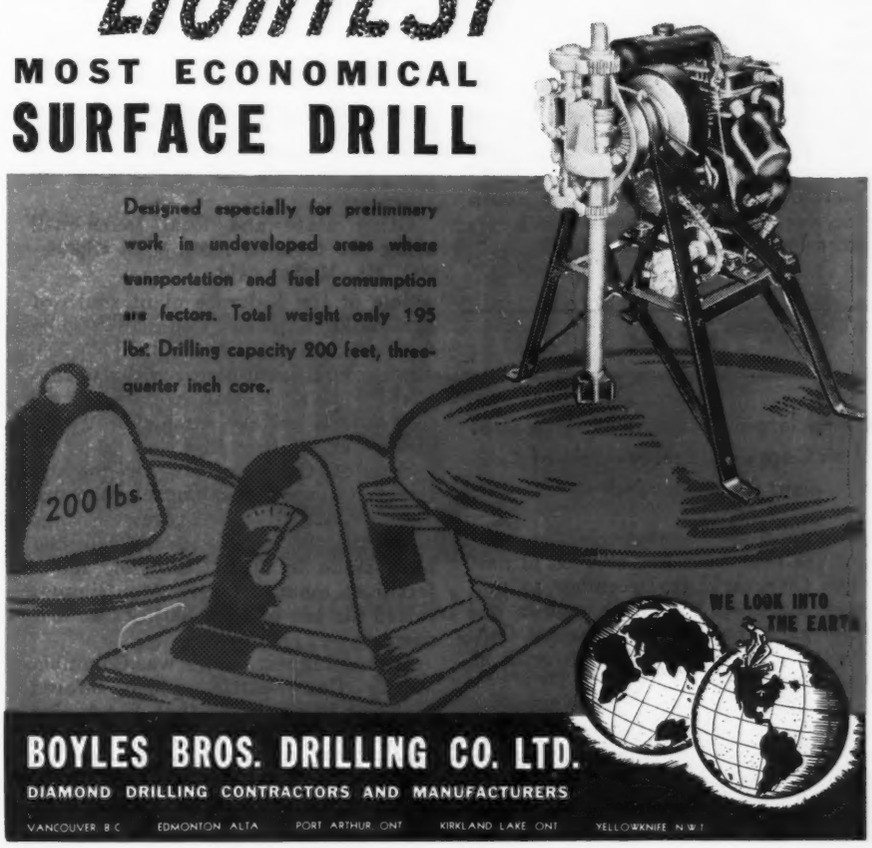
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## Michigan *(Continued)*

to 250,000 lb. per charge. The monthly capacity of the furnace will be approximately 1,500,000 lb. of copper. For the most part, baled material is used in charging the furnace.

★The rebuilding of 1,150 ft. of the Lake Linden coal dock of Calumet & Hecla was completed recently by the construction department of the Calumet & Hecla company. The dock, which is 20 ft. wide, was kept in constant use during the renovating and rebuilding. During this time 15 ore carriers brought cargoes of coal to the dock. Each of these ships delivered an average of 9,000 tons of coal.

★The ventilation and escape shaft which was started several weeks ago at the Iroquois property of Calumet & Hecla has been holed through from the 6th level to the surface, a distance of 640 ft. This completed the first stage of a ventilating shaft which will eventually extend to the bottom of the Iroquois shaft and also provide a secure escape-way.

Continuation of the ventilating shaft is underway from the 10th level up to the 6th, and work from the 12th up to the 10th is expected to be started shortly. Work is progressing in the opening from the 16th level up towards the 12th. Below this point openings have been made from the 20th to the 16th. Completion of the shaft also will permit exploration of the ground adjacent to the shaft.

★Drifting is in progress on both the north and south sides of the 24th level of the Seneca shaft of Calumet & Hecla. The 22nd level, south side, has been completed and drifting is being done on the north side. The shaft is being timbered between the 24th and 25th levels, making it ready for hoisting and other operations from the lower areas of the shaft.

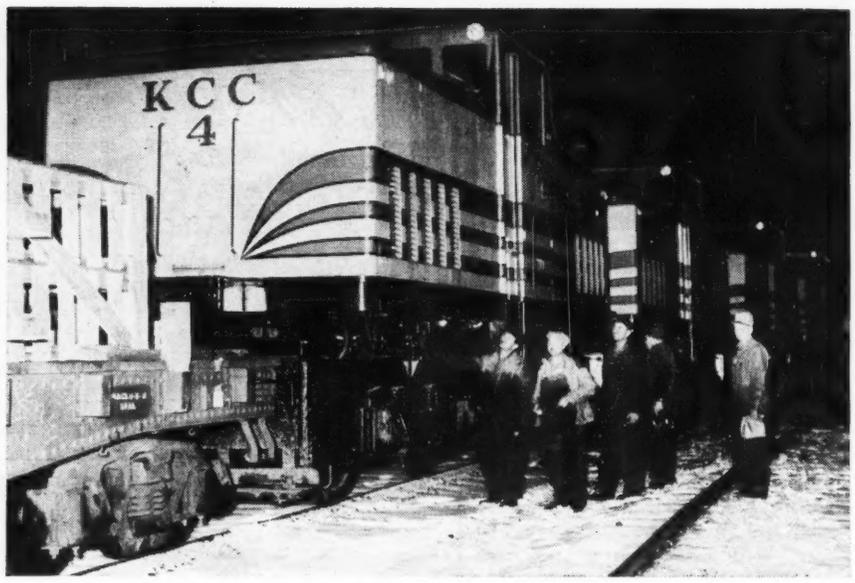
★Drifting is proceeding in the 23rd level of the Centennial mine, south side, for the exploration of the Kearsarge lode south of Centennial.

## UTAH

### New, large locomotives arrive at Utah Copper property—Sale of Kalunite plant recommended

★Four of the largest electric locomotives ever built had arrived in Salt Lake City early in December to pull huge loads of low-grade copper ore from yards below the Kennecott Copper Corp. mine at Bingham to mills at Magna and Arthur.

Three more of the 3,300-hp. locomotives, costing more than $107,000 apiece, were expected to arrive in time to begin operations soon after Jan. 1 on the company's new $4,700,000 industrial line.




Four new 3,300-hp. electric locomotives arrive at Kennecott's Utah Copper Division.

Specially designed for use on the ore run, the 3,000-volt, d.c. locomotives were built by General Electric Co. They were brought to Utah by circuitous route to avoid low bridges and tunnels, requiring ten days in transit.

Placing of trolley wires on the line should be completed before the end of the year, D. D. Moffat, vice-president and general manager of the Utah Copper division of Kennecott, reported. One 3,000-volt, 3,000-kw. rectifier station near Bacchus is virtually completed, and another located near the mouth of Bingham Canyon, will house two 750-volt, 750-kw. rectifiers.

★General property tax paid by Kennecott to Salt Lake County Nov. 26 totaled $2,392,214, of which $14,428.50 was under protest. This was the highest property tax paid by the company and its predecessor in 43 years and was an increase of 125% over 10 years ago.

Other state and local taxes will bring the total to more than $3,200,000, Mr. Moffat said.

★Sale of the Kalunite plant south of Salt Lake City to American Potash & Chemical Corp., which bid $752,000, was recommended by the real property board of War Assets Administration following a private session in Washington, D. C., Nov. 29.

Senators Guy Cordon of Oregon and Harry Cain of Washington had induced WAA to cancel previous bids of which the highest, $510,000, had been made by J. R. Simplot, Idaho fertilizer manufacturer. Mr. Simplot raised his bid to $625,000 for the last opening.

Second highest bidder was Columbia Metals Co., Seattle, which offered $635,000 on condition that WAA also sell Columbia the wartime plant at Salem, Ore., which the latter company is now operating under a month to month lease.

The projected sale to American Potash & Chemical Co. was referred to the Attorney General for an opinion as to whether the transaction would tend to further monopoly.

★A Ninth Court of Appeals order temporarily enjoining the Interstate Commerce Commission from requiring railroads to charge for switching services in connection with operation of smelters was issued Nov. 14. Federal Judge Orie Phillips, Denver, presiding judge; T. Blake Kennedy, U. S. district judge for Wyoming, and Tillman D. Johnson, U. S. district judge for Utah, issued the order following a meeting in Salt Lake City.

The judges said there seems to be inaugurated a new policy in which the ICC may assume power to declare when and where transportation ends and plant service begins and to require transportation companies to file separate tariffs for line-haul rates, as distinguished from services rendered by transportation companies within plants.

In this instance, ICC has not presumed to exercise such authority, the judges held, and decided the cases should be remanded to the commission for further proceedings upon this basis.

★Foreclosure proceedings were filed by United States Smelting, Refining & Mining Co. against the Bingham Metals Co. Nov. 14 in the Federal District Court, Salt Lake City, seeking judgment of $17,559 on two promissory notes. The smelting company asks for court sale of Mercer No. 2 lode and various properties secured by chattel and real estate mortgages.

★Opposition to further increases in railroad freight rates was expressed by western metal mining representatives at an Interstate Commerce Commission hearing which opened Nov. 17 in Salt Lake City.

"The facts of our industry do not justify an increase of freight rates or

charges on nonferrous ores and products at this time, and we give it as our conviction that a comparable reduction of ore tonnage will follow every added operating cost," said A. C. Mackenzie, vice president, Utah Mining Assn.

Charles A. Butler, New York City, general traffic manager for Anaconda Copper Co., said he did not oppose the increase in rates but objected to inequality of a blanket percentage increase. O. W. Tuckwood, general traffic manager, American Smelting & Refining Co., said a rate increase would be undesirable only if it tended to put nonferrous metals at a further disadvantage when compared with iron, steel and aluminum.

Rates on iron, steel and aluminum currently are limited to a maximum number of cents per 100 lbs., they pointed out, and such an arrangement is desired by nonferrous metal producers to prevent blanket percentage increases from destroying relationships between the two.

★The Utah Mining Assn. asked for an extension of the Dec. 31 deadline for mineral exploration to June 30, 1948, in a letter sent to John R. Steelman, assistant to President Truman.

Uncompleted exploration projects, if cut off now, will defeat the purposes of the program to use premium payments to uncover new ore reserves, it was pointed out.

★Culminating a lengthy battle against leftist control of the International Union of Mine, Mill & Smelter Workers, Willard Y. Morris, rightist legal counsel for district union No. 2, MMSW, and for the Utah CIO, resigned recently.

His letter of resignation, addressed to George J. Wilde, president-secretary of district No. 2, and to Clarence L. Palmer, CIO president, said, "Indecision, delay and fumbling have characterized the efforts of those who fought to keep their ranks clean.

"As a result, we find that many of the more important locals have become pawns of the international unions and the communists and serious inroads have been made in several others." He referred to the communist element as "an efficient, formidable foe," not hindered by traditional ethics or standards which most of us follow.

Although the resignation was rejected almost unanimously by the executive board, Mr. Morris terminated his connection with the unions.

## ARIZONA

### Leaching operations planned for Emerald Isle property—Athletic Mining Co. to operate in Klondike district

★Lew and Mathias Co. of St. Louis has started what promises to be a stable operation at the Emerald Isle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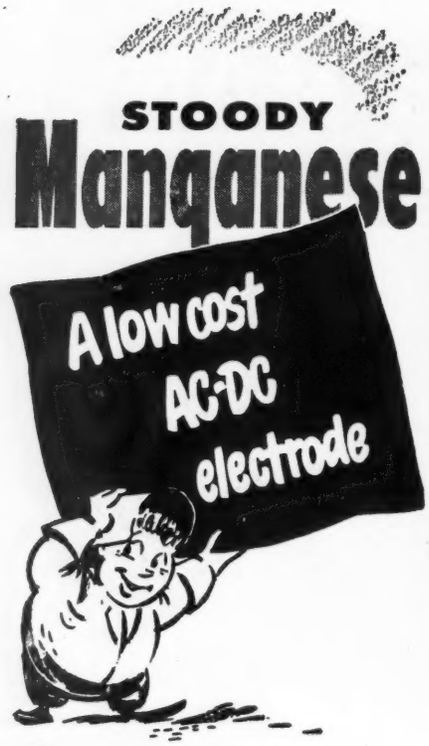


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URANIUM ORE samples in an Australian mine are examined by (left to right): Mr. Playford, Premier of South Australia; Mr. Chambers, Federal Minister of the Army; and Jim and Paddy Cain, two of the original prospectors of the field.

## Arizona (*Continued*)

copper mine two miles from Chloride. The company took over the Emerald Isle property after an extensive search for a good leaching operation to supply metal for its copper fabricating enterprises. They plan to use an acid leaching process in the operations.

★Among the Arizona mines active earlier in the year and now idle are: Binghampton, operated by George L. Hanson, Mayer; Cavenes, J. A. Whitney, Cave Creek; Gold Coin, Carl and John Shoemaker, Prescott; Roosevelt, W. W. Bison, Prescott; Victor Copper, Charles Brown and C. W. Fryor, Prescott; Arizona Klondyke, Robert Hyde, Dos Cabezos; Bonanza, Byrd Brothers, Washington Camp; Bulldozer Sublease, R. E. Chilson, Helvetia; Devonian, L. H. Dykes, Bowie; Doran Prospect, Kennedy, Dos Cabezos; Duquesne, Byrd Mining Co., Washington Camp; Elgin, D. G. Chilson, Helvetia; Fortuna, C. R. Breedon, Arivaca; Gold Pen, T. C. Kinsey, Mammouth; Holland, Byrd Brothers, Washington Camp; Intervenor, A. P. Giacoma, Tombstone; Kansas-Maine-New York, Byrd Brothers, Washington Camp; Keystone, Norman Rhea, Dragoon; LaFortuna, W. E. Holt, Tombstone; and Landsman Group, C. L. Burney, Klondyke.

★Carroll Weed, general superintendent of the Inspiration Consolidated Copper Co., has been elected chairman of the mining division of the Arizona section of the American Institute of Mining and Metallurgical Engineers. The selection was made November 12 at the fall meeting of this body at Superior. Mr. Weed succeeds Wesley P. Goss, general manager of Magma.

★Several small mining properties in the state have reopened after closing down in 1930 when copper prices dropped. They are now making high grade shipments. One of these is the old Black Reef, situated in Cunningham Pass, nine miles north of Wenden. The Black Reef and adjoining claims were recently purchased at a tax sale by William Harris of Yuma who owns the nearby Centroid copper mine. The mine was practically abandoned during war years and became greatly run down.

★Allen Sharp of the U. S. Bureau of Mines, Phoenix, reporting on the Klondyke region, says that the new 100-ton mill of the Athletic Mining Company will start operations at once. All of the equipment is new except the ball mill. The company will use selective flotation with two sets of Denver cells to concentrate the lead-zinc ore. Lead concentrates will be shipped to the American Smelting & Refining Company's plant at El Paso and the zinc will go to the Athletic Mining & Smelting Company's retort furnaces at Fort Smith, Ark. The mill will not take custom ore, treating from the Aravaipi group only.

★A 50-foot winze is being extended in the Iron Cap, four miles north of Aravaipi, and lead-silver ore is being shipped from the Head Center mine, three miles northwest. Extraction at the Head Center is through a 350-ft. incline shaft which must be pumped. It is the only wet shaft in the Klon-

dyke district.

Raymond F. Orr of Fort Smith is president and chief engineer, Harvey L. Horton of Safford is vice-president and manager, and Anthony Bennett of Klondyke is mine foreman. Thirty men are employed and the crew is expected to be increased when the mill is in operation.

★Machinery and equipment has been installed at the Silver Coin mine four miles east of Klondyke, and R. F. Urbana and Knute G. Anderson are manager and superintendent respectively. The mine employs 10 men in reopening the old property. The mine, carrying values in lead and silver, is opened by a tunnel and several shafts.

★Albert Spaulding, Safford, plans to explore several outcroppings of copper-bearing material at the Lone Star group of claims 10 miles north of Safford and has moved a portable compressor mounted on a tractor to the property. The principal vein is 30 in. wide and occurs in a quartz monzonite porphyry.

In the same district some good showings of lead-silver ore have been uncovered by Raymond Pointer while drifting off a winze in the Sein Fein mine 2½ miles northwest of Aravaipa.

★Mining at the rate of 25,000 tons per day, the ore body of the San Manuel Copper Corporation's Tiger deposit may last 50 years, it was predicted this month. The property lies 46 miles northeast of Tucson near Tiger. Within the past four years company engineers have mapped 425 million tons of low grade copper-bearing ore, but additional deposits remain to be explored. Millions of dollars and from three to five years of effort must be expended in preparatory work before ore is marketed, officials state.

The San Manuel will be an underground operation and will use the block-caving method. The new corporation has spent $1,500,000 for churn drilling to map the new deposit. It has borrowed $3,500,000 for shaft sinking, crosscutting, power plant and housing, it has been stated by authoritative mining men.

No information is available concerning plans of the Anaconda Copper Co. for its claims north and east of San Manuel. Anaconda stopped exploration drilling September 10.

According to Wesley P. Goss, general manager of the new corporation, and the Magma Copper Co., preliminary work has already started underground at the San Manuel, looking forward to possible commercial production in three to five years. Mr. Goss stated that because of the low grade of the ore, it is probable that San Manuel will be more completely mechanized than any other underground mine in Arizona.

When production begins, the company plans to employ 1,000 men underground and several hundred as surface workers. The new mining community is expected to have a

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## Arizona *(Continued)*

population of approximately 6,000 persons.

Under construction at present, as preliminary steps to production, is an access road of two miles leading to mine operation points; two steel water tanks of 50,000 gallons capacity; a 4,000-ft. pipe line from Tiger; two dormitories and 20 houses for the 60 workmen on preliminary work.

The 3,000-kw. power plant will be erected as rapidly as machinery arrives. The El Paso Natural Gas Co. will run a 33-mile pipe line to the property starting from Cortaro.

It is expected that power will be available by April or May and after this the second phase of development will start with the sinking of a 2,500-ft. shaft followed by thousands of feet of drifts and cross-cuts. Mr. Goss stated that this development work may answer many questions of physical characteristics of the minerals, which were destroyed by churn drilling. They will also permit final plotting of the flow sheet for the metallurgical plant.

Most of the 0.8% copper is sulphide ore, for which current methods of recovery may be used, but a small percentage is oxide ore, costly to recover by proved methods.

The shaft also will permit exact assays on amounts of gold, silver and molybdenum available. Mr. Goss further stated that a mill must be built for mining production, but construction of a smelter will be decided in future years, as will a possible railroad spur. Smelters are available at Hayden and Superior. Truck haulage has become economic under certain conditions, he said.

★According to information released by Charles H. Dunning, director of the Arizona Department of Mineral Resources, huge deposits of uranium-bearing ores lie undeveloped in northwestern Arizona.

Preliminary sampling of the Arizona deposit indicate the ore contains about 1.5 per cent uranium, worth approximately $28 per ton at a Colorado treatment plant, Dunning stated.

"Because of the remoteness of the deposit, the mining and delivery cost would exceed the price paid and in view of this situation, there now is little incentive to explore and develop the property further or search for similar deposits elsewhere in the state," Dunning declared.

## COLORADO

### Two shafts connect through to Carlton drainage tunnel—Front Range Mines company strikes good ore

★Two deep shafts in the Cripple Creek area, the Portland shaft of the United Gold Mines Co., and the Ajax

shaft of the Golden Cycle Corporation, are now connected through to the six-mile Carlton drainage tunnel.

★A new gold strike has been announced by Front Range Mines, Inc., in its Melvina property in the Gold Hill mining district in Boulder County. The ore was opened up on the 585 level, later on the 630, and now on the 700-ft. level. The first railroad car, after the high grade streak had been sorted separately, settled at the smelter for $32.16 a ton or $1,391.56 for the car. The company also expects to receive more than $100 a ton for 20 tons of high grade ore. The company is making regular shipments from its Strong and Mary Cashen mines in the Cripple Creek mining district, it is stated. In its operation of the Mattie mine in the Clear Creek district, the first car settled at $17.66 a ton.

★A group of Chicago men are financing work on the Capital Prize mine at Georgetown to permit access to caved-in workings for sampling of the mine. Dump material is being trucked to the Ruth mill in Idaho Springs for treatment.

★The Timken Roller Bearing Co. has purchased the eight-acre site and taken over all construction on the new $150,000 rock bit plant at Colorado Springs, Colo., A. L. Bergstrom, vice president in charge of engineering, announced. Most of the equipment in the unit will be new, with some being transferred from the Mt. Vernon plant. A daily output of some 10,000 rock bits a day has been scheduled and about 75 persons will be employed at the start.

★Colorado mine operators have been informed that uranium and thorium are now strictly controlled. Through the licensing provisions of the Atomic Energy Act, the U. S. Atomic Energy Commission has established strict controls over all phases of the production of uranium and thorium, according to announcements from Washington, D. C. The regulations provide that no person may transfer, deliver, receive title to, obtain possession of or export any of the atomic source materials after "removal from its place in nature," without a license from the commission. Ore containing as little as 0.05% comes within the control provisions.

★Reports from Cripple Creek are that excellent ore is opened on the 19th level of the Cresson where new chutes are being installed preparatory to starting a new stope. The Cresson shaft is 2,310 ft. deep, and the water level in the shaft is reported to be two feet below the station of the 20th level at this time. The announced plan of Golden Cycle, Cresson, and United Mines is to drive laterals to the Cresson and to the Vindicator shafts from the depth of 3,200 ft. in the Portland No. 2 shaft where the 6.23-mile Carlton drainage tunnel now taps this shaft. At last reports, the Carlton

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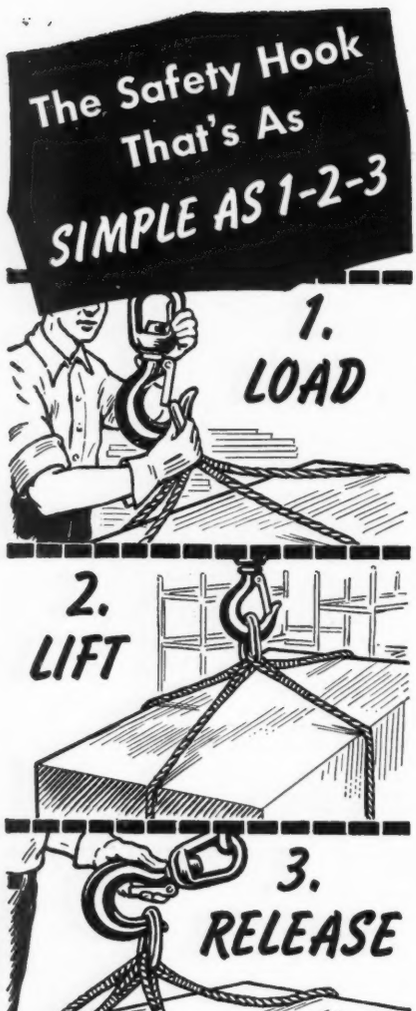


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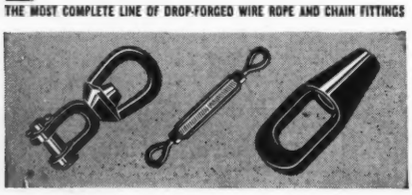


## Colorado *(Continued)*

tunnel was draining the Cripple Creek mining district at the rate of 5,000 gal. of water per minute and, with laterals from the tunnel, will ultimately drain the entire district to a depth of 3,200 ft.

★The Gold King mining property at Gladstone, near Silverton, has been sold to H. C. Orton Co. of Chicago. New owners expect to start work on the property at once. Development of the property is through a 600-ft. shaft and a 3,000-ft. tunnel. The ore is in altered andesite, free gold occurring in white quartz associated with iron pyrite, galena and blende. The ore is in fissure veins.

★O. Barlow Willmarth, of Georgetown, is opening up the Big Bertha group of lead, zinc, and silver mines at the head of Grizzly Gulch above Silver Plume. The group lies on the north slope of Torrey Peak. In the '80's, a tunnel was driven 1,300 ft. in search for high grade silver ore. Lead and silver values in the ore were not sufficient to warrant mining at that time. Ice and rock have been removed from the portal of the tunnel to permit inspection of the vein system.

## NEW MEXICO

### U. S. Smelting patents claims in Central district—Twelve portal-to-portal suits dismissed

★One of the largest group of mining claims to be patented in the Central Mining district, Grant County, New Mexico, in recent years is revealed in a Mineral Application filed with the District Land Office at Las Cruces by the United States Smelting Refining and Mining Co., a Maine corporation, by L. H. Duriez, agent and attorney-in-fact, of Bayard, New Mexico. The claims comprise the Monarch Group of Lodge Mining Claims, and number 20 claims, comprising approximately 230 acres of mineralized ground.

★Harry E. Metz was appointed last month to fill a vacancy created by the resignation of E. C. Peterson at the Burro Mountain Branch of the Phelps Dodge Corporation at Tyrone. The corporation is conducting a large in-place copper leaching operation at this time on its extensive Tyrone holdings.

★On October 17 the directors of the Potash Company of America announced a several million dollar program to increase the productive facilities of the mine and refinery near Carlsbad. Construction work was announced to start in November.

★With increased demand and an attractive market price, many have turned to New Mexico for a search for good kaolin clays. The state contains an abundance of clays, but very few deposits have been carefully sampled and analyzed for market specifications. The N. M. Bureau of Mines & Mineral Resources is pushing tabulation work on all clay deposits.

★Twelve portal-to-portal suits against 11 mining companies operating in New Mexico by members of the International Union of Mine, Mill and Smelter Workers have been dismissed in Santa Fe, N. M. The dismissals were by U. S. Federal Judge Colin Neblett. Named in the original suits were the following companies: Kennecott Copper Corporation (two suits), Banner Mining Co., Phelps-Dodge Corporation, New Mexico Consolidated Mining Co., U. S. Smelting, Refining and Mining Co., International Minerals and Chemical Co., Potash Company of America, U. S. Potash Co., Peru Mining Corporation, Empire Zinc Co. and the Black Hawk Consolidated Mines Co.

## NEVADA

### Eagle-Picher completes diatomite plant—New mills being built in Searchlight area

★Construction of a 500-ton amalgamating mill was completed in November at the Jumbo mine of the Austin Bros. Gold Mining Co. in the Awakening district, Humboldt County. The orebody, some 600 by 2,000 ft. in extent, consists of highly shattered and crushed laminated shale and sandstone with free gold in quartz-filled laminations. It is moved by bulldozer to a glory-hole, dropping to a grizzly and through a raise to a vibrating feeder, and to a 300-ft. conveyor belt in the main tunnel that transports it out of the tunnel to the mill. Initial run of the plant was satisfactory, but capacity operation is not expected before sometime next March.

★The four-compartment Fad shaft of the Eureka Corporation Ltd., operating unit of Ventures, Ltd., of Toronto, was reported nearing the 2,300-ft. point. A pumping station and storage sump have been completed at the fifth, or 1,700-ft. level. First lateral work is to start at the 2,350-ft. level, where a 1,000-ft. crosscut will explore north of the Ruby Fault.

★Eagle-Picher Co. has completed its diatomite plant at Clark designed to produce insulation, fertilizer, insecticide, structural and other industrial products. Diatomaceous earth, loaded by power shovel from a surface deposit south of the railroad, is trucked seven miles to the plant. T. C. Carter, vice-president in charge of the insulation branch, has been at the

plant from the Cincinnati office. T. A. Copeland is manager in Nevada.

★Natomas Co. was said to have completed removal of its Manhattan bucket-line unit, operated below Manhattan, Nye County, for a number of years with profit and rated at 12,000 to 15,000 cu. yd., to the Greenan placer below Copper Canyon, Lander County, leased from James O. Greenan of Reno.

★Output of ore from Tonopah, with no rail outlet since the Tonopah & Goldfield railroad ceased operating last year, is limited to the "chloriding" product of a half-dozen lessees working in the Mizpah mine of the Tonopah Mining Co. October truck shipments to the McGill smelter by six lessees were 185 tons with indicated value of $9,650.

★The Bullion mine in the Sylvania district, Esmeralda County, was purchased recently by C. M. Zabriskie, of Salt Lake City, from D. H. Clair of California.

★Property of the Union Lead Mining & Smelting Co. has been purchased by the recently organized Imperial Lead Mines Inc. Equipment for a 150 to 200-ton flotation plant is being installed. Carl Bevins is president of the company, Paul W. Keating is manager, and F. G. Gibson is vice president.

★New activity at Searchlight, Clark County, is reported to include the construction of a 200-ton cyanide unit to treat $3 to $4 tailings from old dumps of the Quartette and adjacent mines, and a 100-ton flotation custom plant to provide an outlet for complex antimony-bearing ores of the district. Formerly productive mines on which work has been undertaken include the Quartette, Duplex, Cyrus Noble, Blossom, Good Enough, Valley, and Southern Nevada Group.

★Operators of the Little Jupiter mine, Pershing County, which shipped substantial quantities of gold-silver ore before the war, report that bulk samples sent to a metallurgical plant for analysis ran 20 oz. gold, 6 oz. silver, and 2.50 oz. palladium, with a small amount of lead. The presence of palladium had not been detected in earlier sampling, according to the operators headed by Ray West of Mill City.

## CALIFORNIA

### Western Borax mine is sold—Stripping in progress at Red Cross mine

★Vivian Mining Co. has started construction of a 50-ton cyanide mill at its Pine Hill gold property near Grass Valley, Nevada County. A substantial tonnage of good milling ore has been developed during 18 months of


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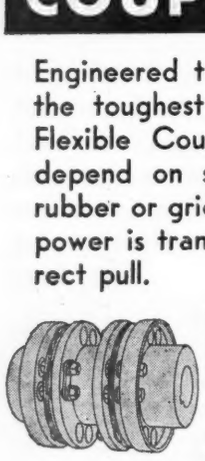

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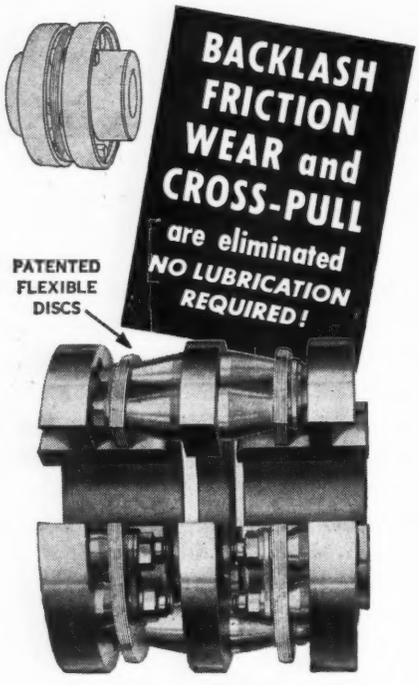


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## California *(Continued)*

work conducted above the adit level. H. W. Klipstein is president of Vivian Mining Co., B. C. Austin, managing director, and Walter Hoppe, superintendent.

★Sale of the Western Borax mine in Kern County for $491,225 to Harvey S. Mudd, Seeley G. Mudd, Henry T. Mudd, and George D. Dub, owners and operators of Pacific Alkali Co. of Los Angeles, was approved by Federal Judge Louis E. Goodman. The holdings owned by Borax Consolidated, Ltd., cover some 640 acres, and the sale was one of the moves in dissolution of the borax trust, as ordered in a consent decree to the civil antitrust suit filed in Federal Court last September. The processing plant will be sold separately.

★Central Eureka Mining Co., operators and owners of the Central Eureka gold mine at Sutter Creek, Amador County, levied an assessment of 25 cents a share on capital stock, payable December 1. The levy, which was the seventh since September, 1945, brings total assessments to $1.20 a share on the $1 par value stock. C. C. Prior, president, said the levy was necessary because of increases in cost of labor and supplies. Mr. Prior also reported that effective December 1, miners' wages have been increased 34½c. an hour to defray increased cost of living. In addition a 50c. a day premium will be paid to employees who work continuously during a calendar month. The company hopes to end absenteeism by this method.

★Milling operations are reported to have been resumed at the Oro gold mine at Downieville, Sierra County, after a shutdown of several months because of shortage of water. The property is operated by Associated Metals, Inc., Ira Mahon, manager, which also owns the Pine Grove gold mine in Amador County, where a mill was installed recently. James Bonner is superintendent.

★Fred Anderson, manager, Ancho-Erie Mining Co., has purchased the Best & Belcher mining properties, including the Red Cross mine near Omega, Nevada County, from the Martin Estate. Stripping operations are now in progress at the Red Cross property, idle since 1915, and Mr. Anderson expects to start processing 100 tons of ore a day in the near future.

## MONTANA

★At the recent annual meeting of the National Safety Council, Inc., held in Chicago, John L. Boardman, Butte, chairman, Bureau of Safety, Anaconda Copper Mining Co., was elected general chairman of the national Mining Section of the Council.

★E. G. Smith and associates, Wallace, Idaho, are now operating the 120-ton flotation mill on the King and Queen and other properties of the Nancy Lee Mines, Inc., near Superior, Mineral County. Concentrates are being shipped to the A. S. & R. smelter at East Helena.

★Carbonate Mines, Inc., has filed incorporation articles in Montana, with authorized capital of $50,000. Elmer E. Johnston, W. T. Anderson and C. F. Liese, all of Spokane, are incorporators, and it is believed that the company will operate near Marysville, Lewis & Clark County.

## WASHINGTON

### Three firms expected to bid for lease of Mead plant—Strike reported at Moonlight property

★War Assets Administration's Seattle office announced that bids for lease of the Mead magnesium plant, at Spokane, would be opened in Seattle Dec. 15. Three firms expected to bid for the lease, all producers of ferro-silicon used in production of metal alloys, were Chromium Mining & Smelting Corporation of Ontario and Buffalo, N. Y., Electro-Metallurgical Co. of New York, and the Pittsburgh Metallurgical Co. of Niagara Falls.

★Rowland King, manager of the Spokane office of Sunshine Mining Co., was elected president of Northwest Mining Association Nov. 17 and took office Jan. 1. J. E. Berg, general manager for Federal Mining & Smelting Co., Wallace, Idaho, was named vice president, Charles P. Robbins was re-elected treasurer and Roger O. Oscarson was named managing secretary.

★Regulation "A" of the Securities Exchange Commission provides an exemption from the registration requirements of the 1933 securities act for nonassessable securities. A total amount of $300,000 may be offered each year. During October the following Washington offerings were filed with the regional office at Seattle under the above regulation: Moonlight Mining Co., Inc., Newport, 150,000 shares for $15,000; Associated Mineral Investors, Inc., Kennewick, 2,000 production certificates and 400,000 shares for $200,000; and Saranac Mining Co., Spokane, 50,000 shares for $15,000.

★Pacific Mutual Silver-Lead Co. is preparing eight claims for patent, at its property east of Kellar, according to Clare A. Gray, manager. Two other claims have been acquired. Efforts are being made to start producing ore next spring. Recently 4,000 ft. of bulldozing have been completed.

★Thomas Lane and E. R. Nicholson, former G. I.'s, have reported a strike at the Moonlite mine, 25 miles north

of Colville. After sinking about 12 ft. following a stringer, the stringer widened to about 6 in. Assays showed 67% lead, 251 oz. silver to the ton, with showings of zinc and copper and traces of gold. Twenty tons of high grade was trucked to the Bunker Hill smelter late in November, with returns of about $300 a ton expected. Development will continue this winter and a small mill will be installed in the spring if showings warrant it.

★D. A. Rhoades, general manager of Permanente Metals Corporation, has announced that Kaiser's bid for the Aluminumwerke Tscheulin plant at Teningen Baden, Germany, has been accepted and approved. Engineers will go to Germany about Jan. 1 to dismantle the plant, the purchase and transfer of which will cost about $1,000,000. It is equipped to produce all kinds of foil. Decision has not been reached as to whether it will be operated in connection with the Tacoma reduction plant or the Trentwood rolling mill.

★Richard Munter, Spokane attorney, announced Nov. 21 that he was taking options on several mining properties near Metaline Falls for a client. Negotiations have been made through John Holland, mining engineer. Properties on the west side of the Pend Oreille River, owned by E. O. Dressel, Ira Troyer, and A. B. Kempe have been signed up.

★E. Y. Dougherty, consulting mining engineer and former head of the U. S. Bureau of Mines office, in Spokane, told the Mining Bureau of the Spokane Chamber of Commerce recently that the Canadian government is giving more attention than the United States to the mapping and studying of formations. He said the airplane has transformed the mode of transportation for Canadian prospectors. The American mining industry exceeds the Canadian in only one activity, the use of the bulldozer on hillsides to expose ore veins, he said. He urged American mining companies to do more diamond drilling, the United States Geological Survey to do more mapping, and the mining interests to give more attention to magnetic prospecting and geophysical search for orebodies.

## IDAHO

### A.S.&R. enlarges Vulcan shaft—Sunshine Consolidated starts raising and stoping operations

★The American Smelting & Refining Co. has completed, under direction of the Federal company, enlarging of the Vulcan shaft on Lake gulch, west of Wallace, to four-compartment size down to the 800 level. The shaft is 1,200 ft. deep. It is expected the remaining 400 ft. can be completed within a month and work started to


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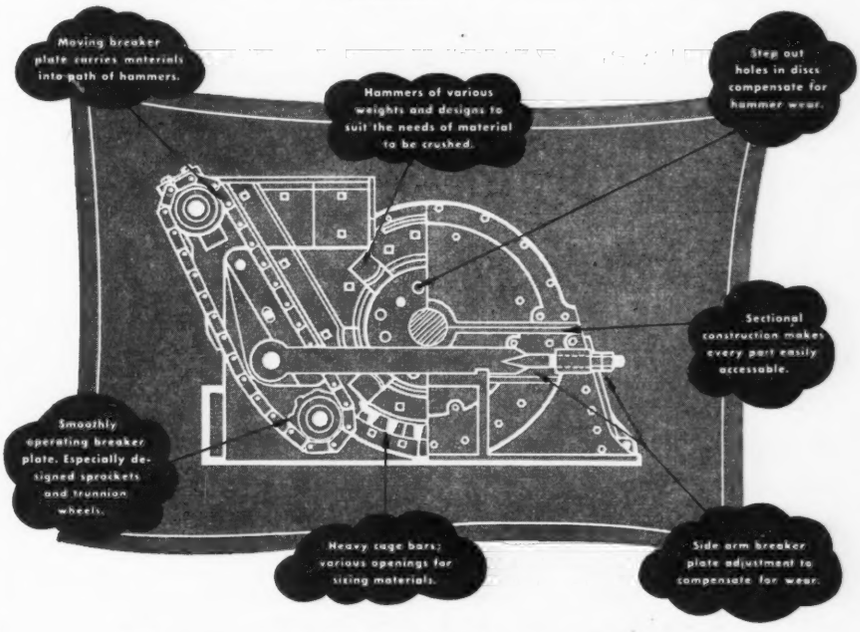
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## Idaho *(Continued)*

continue the shaft on down to the 3,000 level. The Fern Mining Co., controlled by the Day interests, is reported to be standing one-fourth of the expense for the privilege of cross-cutting into Fern property, which adjoins the Vulcan on the south. A. S. & R. holds the property under lease from the Callahan Zinc-Lead Mining Co., which sunk the shaft, built a mill and mined considerable high grade silver-lead ore from the mine when it was called the "Galena" property.

★The Coeur d'Alene Mines and the Coeur D'Alene Consolidated Silver-Lead Mining Co. have joined forces to prospect on the deep 2,800 level a large group of mining ground lying south of the Coeur d'Alene Mines shaft. The Consolidated company is paying for the work of driving a cross-cut tunnel through the American Silver, Silver Standard, Michaels & Fahle, andFreeman & Sites groups of mining claims, all of which are located in the "silver belt" of the district. This cross-cut tunnel has now been driven a distance of 2,800 ft. from the shaft. It has passed through the Polaris fault and is in leached territory favorable to ore deposition, and is within about 700 ft. of the Fort Wayne vein which outcrops on the American Silver claim.

★Lucky Friday Silver-Lead Mining Co. at Mullan now has a shipment of over 2,000 tons stockpiled and ready for shipment to the Golconda custom mill. According to receipts from former lots, this shipment will net around $60,000. The ore is from stoping operations on the 1,400 level. Company officials announce that sinking operations will be resumed early in the coming spring.

★The Sunset Minerals Co., operating the Liberal King mine on Pine Creek, has completed sinking a winze from the 1,000 to the 1,200 level and announces improvement in the orebody, stating that it contains more lead than the ore above the 1,000 level. The vein is a flat dipping structure without an outcrop, so far as known. It was first encountered when the shaft passed through it on the 1,000 level. The ore was mill tested by local people without success. Later the property was sold under lease and bond to a Seattle company known as the Sunset Minerals. This company erected a modern milling plant and made a success of the operation by grinding the material to 300 mesh, 100 mesh finer than the average practice in the Coeur d'Alenes.

★Sunshine Consolidated Mining Co. announces that it has started raising and stoping from the 3,100 level, operating through Sunshine mine workings. The company has drifted over 1,000 ft. on ore that has averaged around 30 oz. in silver. Sunshine Mining Co. is half owner in the property.

★Independence Lead Mining Co. officials announce that the company has been cleared of all pending litigation growing out of recent difficulties in director personnel, and the company is now considering plans for deeper development. Independence Lead is situated between Morning and Hunter mines at Mullan on the strike of both Morning and Hunter vein systems.

★The Highland-Surprise Mining Co. has opened its orebody on the 1,000 level, where it shows a width of 22 ft. of good milling grade zinc-lead ore. The average mill head for the ore is reported by mine officials to be 10 to 15%, but the ratio was not stated. The company is now sinking to the 1,100 level.

★Hecla Mining Co. is continuing prospecting and deep development of a large group of claims on Rock Creek, midway between Wallace and Mullan, in a territory which is believed to be the eastern extension of the Silver Belt. Surface prospecting in this area has uncovered a series of promising veins warranting prospecting at depth. Samples from an 18-inch. streak recently uncovered assayed 50 oz. silver and 14.4% lead. Hecla has started a three compartment shaft to search at depth.

## ALASKA

### Mining activities summarized at close of operating season

★Robert S. Sanford, Chief of the Alaska Division of the U. S. Bureau of Mines, after a four-month field trip through the Territory, summarized 1947 conditions as follows: Most mercury mines shut down because of decrease in price; added interest in platinum and coal production; Navy is still investigating oil possibilities along the Arctic; interest in tin mines continues but these are not yet in production; copper, lead and limestone mines are inactive.

★According to A. J. Stern, president of Alaska Mining Co., Inc., 1,600 ft. have been opened at the property in the Ester district, and a number of veins ranging from 3 to 16 ft. wide have been opened. He reported in November that one tractor had been operating for several weeks.

★George Swanson was operating a bulldozer at his claims north of the Alaska Mining Co.'s property, while P. R. & H. Mining Co. was also operating in the district. Gus Parris and Wen Wartz operated a bulldozer on their claims, near Ester, in early November, and later in the month were clearing the shaft to start operations.

★C. J. Berry Dredging Co. used two diesel engines during the 1947 season to replace its two condensing steam engines at its gold dredge on Mam-

moth Creek, in the Circle district. Over 250,000 yds. of gold-bearing material was moved.

★P. J. Gilmore, U. S. Recorder in Ketchikan, reports the following mining claims filed: Alaska Jernberg Placer claims 1 and 2 on east shore of View Cove, northeast of Reef Point, by R. L. Jernberg. Point Higgins lode claims near Pond Reef, B. R. Libe. Milkyway limestone lode claims 1 to 6 on the west shore of Carroll Inlet, Henry A. and Harriet K. Stensland. Betty lode claim adjoining the Point Higgins claim, F. H. Bold. Deep Water limestone lode claims 1 to 7, at Lest Cove, C. J. Clement and A. H. Stensland.

★Small operations are reported for the past season from Ruby: George Miscovich has been in charge of a crew of nine men operating a bulldozer, dragline and pump, on Flat Creek. Iver Johnson has employed a crew of three men operating draglines and bulldozers on Trail Creek. Denny Coyle and Walt Rasmussen had a fair season on Midnight Creek. Clarence Beiser stripped on leased ground on Spruce Creek. Long Creek Mining Co. had Hans Tillison in charge of bulldozer and dragline work on Long Creek. Three to five men were employed in one shift during the season. Goodnews Bay Mining Co. had Harry Wilson in charge of a crew of three drilling to test ground on Birch Creek. Joe Ferris planned to sink holes on his ground on Solomon Creek during the winter. Carl Webster has been supervising stripping operations on Poorman Creek for Vance Hitt who hopes to get into production next summer.

★Cleary Hill Mines Co. has closed down its quartz gold mining, according to R. C. Wyer, manager, because of shortage of men. Only diamond drilling will continue through the winter. A new drainage system was completed, and development work was carried on with the men available. Ample ore reserves are open for the 1948 season if miners can be procured. The company will continue its placer operations at Tofty where it has ground stripped for several years of operations. Tony Lanning is in charge.

## CANADA

### Miners not keen on proposed gold subsidy—Uranium found in NWT—Ontario gold output drops

★Canadian gold production increased 7% in the first eight months of 1947 at 2,036,208 fine oz. compared with 1,898,999 in the same period of 1946. Gold recovery in August was 260,891 fine oz., up from 231,200 oz. in the same month a year ago.

★When the session of Parliament opened Dec. 5, the gold production


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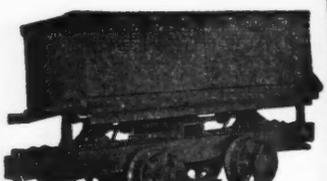

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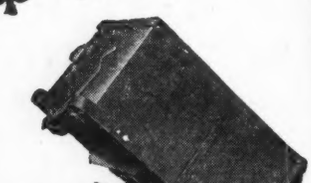

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## Canada *(Continued)*

bonus plan came up for debate. The proposed $7 bonus, to apply to all output in excess of the mill rate in the year ending last June would not, in the view of many observers, cause a boost in gold production. This gold question threatens to drive apart Canada and the United States at the present important stage of laying foundations for closer relations between Washington and Ottawa. Yet Canada's financial resources have been reduced to a point where the only two alternatives now appear to be devaluation of the dollar to 80c or a drastic move to set up free trade with the United States.

The gold problem is being discussed by mine operators in a series of conferences with C. D. Howe, Minister of Reconstruction, W. B. Timm, Director of Mines and Resources, and other officials. A brief submitted by the mine operators offered "all-out support to any plan" set up by the government, but showed that 11% of the gold output from Ontario and Quebec was recovered at a loss in 1946-1947. These unprofitable mines will be forced to close unless provision is made for an adequate price increase. Canadian mines have suffered an annual loss in gold production amounting to $100,000,000 for which government compensation is being sought in a series of Ottawa conferences.

★Officials of the British Columbia Department of Mines on Nov. 26 confirmed reports of uranium discoveries by Gold-Uranium Exploration, Ltd., in the Northwest Territories at Beaverlodge and Hardisty Lakes, about 100 miles south of Port Radium, Great Bear Lake. The occurrence of pitchblende at both localities, however, had been described in 1934 by Dr. D. F. Kidd in a report of the Canada Geological Survey. The Department of Mines and Resources stated that no report had been received of new discoveries in that district. The Canadian Atomic Energy Control Board, which has strict regulations prohibiting private control of fissionable materials, stated that an investigation was being made to determine whether security provisions of the board had been violated by disclosing the location of the reported pitchblende discovery. The violation of Canadian restrictions involves a maximum penalty of $10,000 fine or five years' imprisonment.

## ONTARIO

★Despite recommendations by conciliation boards that no check-off of union dues be granted in the gold camps and that no wage increase at this time was practical, demands are being made by the International Mine, Mill and Smelter Workers Union for a pay advance of 22c an hour. High-pressure campaigns have been started under the direction of Reid Robinson at Kirkland Lake and Harlow Wildman at Timmins.

★Gold output in Ontario dropped to 147,902 oz. in September, the lowest since September, 1946. Grade of ore was $8.86 a ton, the highest since June, 1947. Gold mine employment reached a high of 12,665 in July for Ontario but dropped to 12,023 in September. The labor shortage, combined with uncertainties of gold mining, has led to seriously reduced prospecting activities throughout the province. Small shipments of gold ore have been reported by the Ontario Department of Mines from the Van Houten, Maylac, Goldhawk, and Jellicoe mines. Omega Gold Mines, producing since 1936, shut down in June. Production at the Jason mine was resumed in September, 1946, and terminated in June, 1947. Berens River Mines, after a shut-down of several months, resumed ouput in 1947, and the new Renabie mill has been operating successfully since July, 1947.

★Walter F. Brown, mine manager at Broulan Porcupine Mines, reports ore reserves sufficient for about two years, which places the mine on a salvage basis. The orebody at a shallow depth dips into the Pamour property. Several new ore chances have been turned up by exploratory diamond drill holes, which are to be investigated in 1948. The scale of milling, averaging 234 tons daily, was considerably lower in 1947 than in the previous year. Mill recovery for the first nine months of 1947 w s $5.66 a ton. The life of the mine can be extended by treating ore from the neighboring properties of Bonetal Gold Mines, which ships 100 tons a day, and the Porcupine Reef, where a 1,000-ft. shaft is being put down to develop a promising orebody. Dr. W. F. James and Dr. B. S. W. Buffam are consulting geologists.

★In January, Naybob Gold Mines (1945) planned to resume production with its 200-ton mill that had been idle since early 1943. M. MacSchwebel, president, reports that exploration since 1946 has included 13,000 ft. of diamond drilling and upwards of 2,000 ft. of drifting, crosscutting, and raising. New tonnage has been developed chiefly in the west workings above the 200 level, although erratic values have made it difficult to arrive at any close estimate of ore grade. Diamond drill exploration has been attempted down to 700 ft., and raising above the 950-ft. level has encountered some good ore. High values were found in reopening old stopes on the bottom 1,175-ft. level. A. G. McKenzie is mine manager.

## QUEBEC

★The Aluminum Co. of Canada, subsidiary of Aluminum Limited, produced 127,000 metric tons of ingot in the first half of 1947 compared with 77,000 tons in the same period of 1946. Operations at the Arvida plant were 55% of the wartime peak, and in the

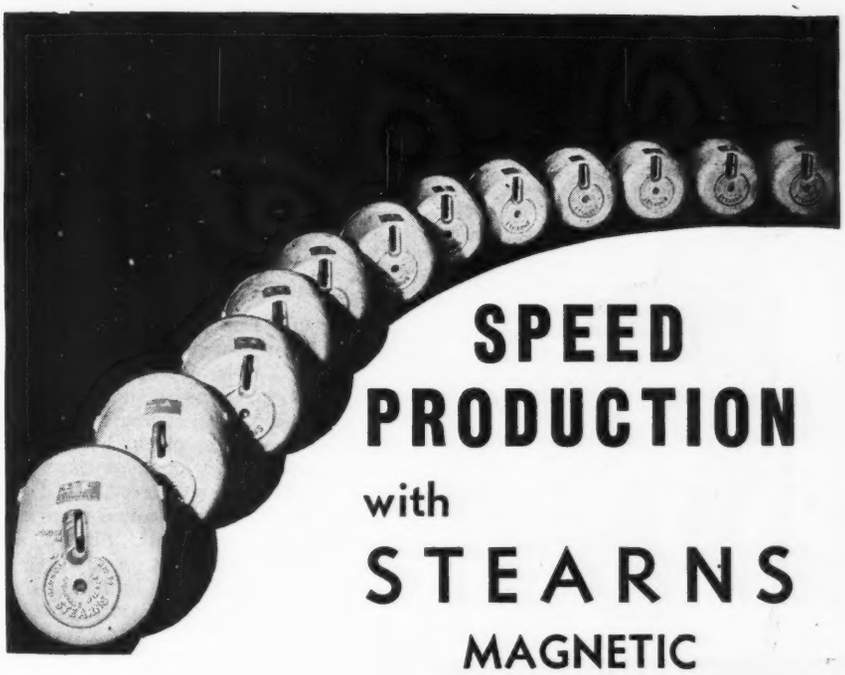
second quarter ingot output was at the annual rate of 278,000 tons compared with peak wartime production in 1943 of 450,000 tons. Output in 1937 was 42,500 tons. Hydroelectric capacity had advanced from 550,000 to 1,500,000 horsepower. A four-year expansion program has been announced using $30,000,000 for new fabricating plants in Canada and abroad to provide additional outlets for ingots produced at Arvida. Profit in the first half of 1947 was $8,700,000, after taxes of $7,000,000 and $1,000,000 reserve against loss on prewar investments by Aluminum Limited.

★J. P. Millenback, general manager, reports that Canadian Malartic Gold Mines has planned increased tonnage for the summer of 1948. The mill rate will be advanced from 950 to 1,200 tons a day following the installation of a new rod mill. The new unit will equip the mill to treat the ore of increased hardness that is coming from the lower levels. The winze from the No. 2 inclined production shaft has been deepened to 1,625 ft. In 1946 the average recovery was $4.09 per ton, on which the operating, marketing, and general costs were $3.38.

## MANITOBA

★Shaft sinking and surface construction is progressing satisfactorily at the Snow Lake property of Howe Sound Exploration Co., Ltd. The five-compartment shaft has passed a depth of 940 ft. and ore pockets have been established at the 320, 580 and 780-ft. levels. The 580-ft. level will be initially the main haulage level. Hoist houses have been erected and man and ore hoists installed. The steel headframe equipped with ore bins of 2,600-ton capacity and waste of 500-ton capacity has been completed. The dry house, with accommodation for 250 miners and 100 others, and the assay laboratory have been completed. The warehouse, construction, repair and smith shops will be housed in a single building, 245 x 90 ft., to facilitate maintenance. The company expects production to start before the end of 1948. The road from Mile 81 on the Hudson Bay Railway, a distance of 37 miles, is now in use, but needs more work to make it suitable for all-year traffic. It is expected that 4,500 tons of freight will be hauled to the mine site during the present winter season. Work on the townsite is also making progress; residential dwellings and business establishments are being built. The staff house and a 25-bed hospital ready for emergencies have been completed.

★E. L. Brown, president, Sherritt Gordon Mines Limited, reports that during the third quarter of the year 52,237 tons of ore was milled from which was produced 2,486,498 lb. of copper; 640 oz. of gold; 20,124 oz. of silver; and 1,320 tons of zinc concentrates. Operations were suspended on August 13th by a strike called by the

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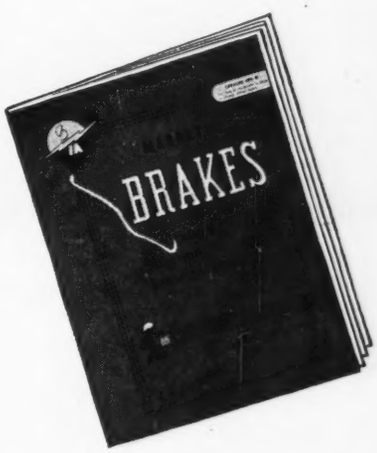

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## Canada (*Continued*)

International Union of Mine, Mill and Smelter Workers; consequently production was drastically reduced. However, due to the lag between production at the mine and refinement of the metals elsewhere, the company marketed 6,469,908 lb. of copper during the period. Realized profit before write-offs was $395,944; exploration amounted to $233,868.

★At Lynn Lake, during the third quarter, a five-compartment shaft was started in the vicinity of the "A" ore-body. Sinking was suspended after 50 ft. pending the pouring of the collar and the erection of the headframe. Preparations for a shaft at the "EL" ore-body have been deferred until additional results are obtained from the new copper-zinc deposit. Should the latter prove important, a shaft site will be selected to serve both deposits. Operations at the Sherritt Gordon mine were resumed on November 17th, when some hundred men returned to work following an injunction being obtained by the company restraining picketing. The Mine, Mill and Smelter Workers Union then formally terminated the strike and an additional 145 men returned to work. Since this date the Federal Union of Base Metal Miners (A.F.L.) served notice on the company that it represents a majority of the employees and will apply to the Manitoba Department of Labour for certification.

★The strike at the Sherritt Gordon mine has permitted the Hudson Bay Mining and Smelting Co., Ltd., to increase somewhat the tonnage of its own ore milled. In the third quarter of the year the company milled 470,888 tons as compared with 462,488 in the second quarter. Total tonnage milled for the first nine months of 1947 was 1,383,610 as compared with 1,378,526 in the same period af 1946. Profits for the first nine months of the year were $9,635,752, equivalent to $3.49 per share. The profit for the calendar year 1946 was $3.21 per share.

★Shareholders of Kiwago Gold Mines, Ltd., have approved the sale of the company's assets to a new company to be formed with an Ontario charter. The new company will assume all debts of the present organization. The property adjoins that of Ogama-Rockland Gold Mines Limited in the Beresford Lake area. Some underground work has been done by the present owners.

★Financing of Ogama-Rockland Gold Mines, Ltd., has been completed by a loan of $325,000 from Gunnar Gold Mines, Ltd. The loan is a first mortgage on the property repayable at the rate of $25,000 per month beginning in the second month of production. Gunnar also holds an option on 198,376 shares of Ogama-Rockland stock at 70 c. to be exercised within two years. Milling operations are expected to start early in June, 1948.

★San Antonio Gold Mines Limited report that 109,892 tons of ore was milled during the first 40 weeks of 1947. Gold production was $1,218,333, equivalent to a recovery of $10.97 per ton. Operating costs were $6.57 per ton before provision for taxes and depreciation. Net operating profit for the period, also prior to taxes and depreciation, was $483,525. Net working capital, as at October 7th, was $812,200 as compared with $708,803 at the year end. Sinking of the No. 4 winze has passed the 3,300-foot mark. Two new ore-bodies Nos. 52 and 57, in the eastern part of the mine towards the boundary of Forty-Four Mines Limited, have yielded diamond drill intersections of mine average across good widths.

## BRITISH COLUMBIA

★The value of mineral production in British Columbia during 1947 will exceed $105,000,000 according to a forecast by Dr. Hartley Sargent, chief mining engineer of the Department of Mines, after a preliminary survey. This is the highest value yet recorded in the province, exceeding by far the $78,479,719 for the year 1941.

The quantities and values of coal, non-metallics, clay, and clay products, and other structural materials, are not expected to differ greatly from the 1946 figures. The quantities of gold and copper will materially exceed that of the preceding year, during which most of the mines were closed for fully half the period by a province-wide strike. Advances in the price of copper are expected to result in trebling the value of output. The quantities of silver, lead, and zinc will be less than in 1946, but the values of production will be substantially higher. Only in the case of silver is the price lower than in 1946, while in the case of lead the price is nearly double the average price for any year this century. The gross value of lead and zinc production, indeed, is expected alone to approximate the gross value of all mineral production during the war years of 1943, 1944, and 1945.

Dr. Sargent states: "Production of tungsten concentrate was begun about the middle of the year at the Emerald mine in the Nelson mining division. This tungsten mine, developed and brought into production of Wartime Metals Corporation, was bought in 1946 by Canadian Exploration, Ltd., and was re-opened after being shut down since 1943.

"High prices have stimulated interest in silver-lead-zinc camps. Exploratory programs begun in 1946 have been continued in the Slocan camp and additional companies have entered the field. Production has been resumed at the Kicking Horse mine of Base Metals Mining Corporation. Salvage of ore from the dumps of the Giant at Spillimacheen has been undertaken. Work designed to bring into

production the Toric silver mine at Alice Arm continued, and interest has been shown in other silver-lead-zinc camps.

"The total recovery of placer gold in 1947 is expected to be less than in 1946. Placer mining was much less than usual in Atlin; and elsewhere, except for the dragline dredging operation on Swift river, placer output has not increased materially. Interest in ground suitable for dredging has resulted in testing several areas in the Cariboo, Manson Creek, and McDame Creek areas. Late in the season road construction was begun to make a connection from the Alaska Highway to McDame Creek, where placer ground was tested by California interests. The McDame Creek district also has lode possibilities which may receive further attention if conditions are favorable for gold mining."

★New wage agreements have been made between locals of the International Union of Mine, Mill and Smelter Workers at Britannia Beach and Copper Mountain and the Britannia Mining and Smelting Co., Ltd., and The Granby Consolidated Mining, Smelting and Power Co., Ltd., respectively. The base rate has been raised for miners from $7.01 per shift to $8.10 and, for the duration of the one-year contract, one copper bonus of 25c. per shift is guaranteed. Four such bonuses, making a total daily wage of $9.10, are currently being paid. Thus the new contract presently represents a gain of 84c. per shift. At one time during the past summer seven copper bonuses, aggregating $1.75, were paid. In line with the policy of the Bridge River gold mines, the daily charge for board has been increased from $1.35 to $1.75.

★During October, Silbak Premier Mines, Ltd., Portland Canal district, produced 394 tons of concentrate, yielding 1,142 oz. gold, 6,041 oz. silver, and 207,007 lb. lead, after treatment of 5,606 tons of ore. Additional flotation equipment has been ordered for the installation of a zinc circuit which Dale L. Pitt, managing director, says will not only produce fresh revenue from the additional metal recovery, but will permit a greatly refined concentration of lead. The company plans to abandon the long aerial tramline in the spring of 1948, after which all concentrates will be hauled to tidewater in heavy trucks. An illegal walkout of employees ended November 15th after two days of shutdown. The dispute arose over a difference in interpretation of a clause in the labor contract regarding deductions for union dues and special assessments.

★Western Mining and Development Syndicate has been formed to develop the HPH group of high-grade silver-lead-zinc claims at Nahwitti lake on the north end of Vancouver island. T. S. Davey, consulting engineer, is making preliminary arrangements at the property for a geophysical survey

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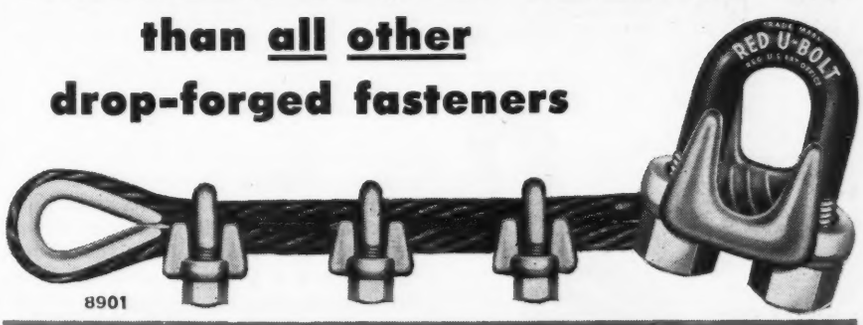

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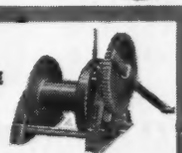

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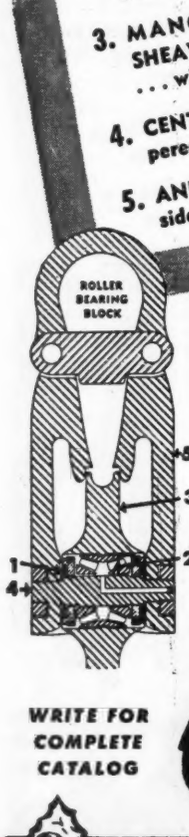


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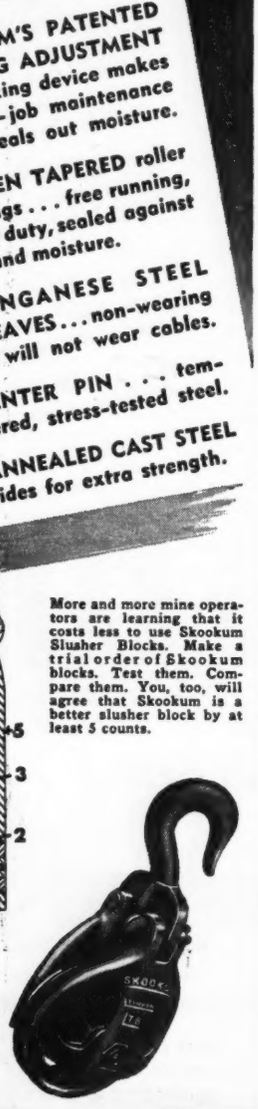

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## Canada *(Continued)*

to be undertaken by Hans Lundberg of Toronto.

★Lowhee Mining Co., Ltd., one of the oldest hydraulic mining operations in British Columbia, has suspended work in Lowhee gulch, Cariboo district. Production during the past year has fallen to 300 oz. gold after a steady decline through the past seven or eight years. Jos. House, mine manager, states some favorable sections will be let on "lays" to former employees. The company was financed by Tacoma interests.

★Leases on 25 mi. of placer ground in the valley of the Willow river, Cariboo district, have been acquired by United Mining and Dredging Company of California. Drilling and testing have been in progress during recent months and, if this proves sufficiently encouraging, the company will import a 3,000-cu. yd. all-steel dragline dredge and commence mining during the 1948 season.

★During the quarter ending October 31st, Hedley Mascot Gold Mines, Ltd., Osoyoos mining division, produced gold valued at $151,318. This included recovery valued at $123,800 from 8,641 tons mined in the Mascot fraction and $27,518 from 1,565 tons from the Good Hope group. Total production since milling was resumed April 14th to October 31st was valued at $357,248. During the quarter under review, $37,164 was expended on exploration and development, making a total for the 6½ months of $74,761. The sum of $5,687 was added to cash reserves. Owing to winter weather the open-pit mining of the Good Hope claims was suspended until late next spring.

★Highland-Bell, Ltd., Beaverdell district, will pay dividend No. 32 of 5c per share January 5th to shareholders of record December 20th. The operation has benefited from the strengthening of the price of silver during recent months. An official advice to shareholders states: "Production is coming largely from the new stopes off the 7-level. Normal grade of ore over greater-than-normal widths has been opened for a length of 140 ft. and ore is indicated ahead by drilling for another 100 ft. This is a new fault block of the Lass lode and is distinct from the ore found in the Idaho mine." Scraper slushing in the stopes was recently commenced and this resulted in a reduction in the cost per ounce of silver produced but at the same time caused a greater degree of dilution. To counteract such a situation a washing plant was installed on the surface, thus permitting the rejection of approximately 25% of the material hoisted as waste.

★The mill of Kenville Gold Mines, Ltd., Nelson district, which was commissioned little more than a month ago, is now treating 100 tons of ore daily and is expected to reach capacity of between 125 and 140 tons daily within the next two weeks. At the present time 150 men, of whom half are underground workers, are employed under the direction of W. B. Montgomery, mine manager. The company is a subsidiary of Noranda Mines, Ltd., and Quebec Gold Mining Corporation.

★The rate of milling at the Emerald Tungsten mine, Salmo, B. C., has reached capacity of approximately 250 tons daily. The property was purchased from War Assets Corporation last winter by Canadian Exploration, Ltd., a subsidiary of Placer Development, Ltd., for a price of $950,000, of which $50,000 was paid in cash, the balance to come from production. With tungstic oxide now valued at $32 per unit, equivalent to $1.60 per lb., the company finds a ready market for its product. The present staff of Canadian Exploration includes: H. L. Batten, managing director; J. A. Mackenzie, in charge of outside exploration; Harold Lakes and W. C. Ringslaven, consulting geologists; G. M. Christie, resident manager; W. A. J. Marshall, purchasing agent and in charge of concentrate sales; B. N. Murphy, resident engineer; H. M. Powell, mine superintendent; J. B. Magee, assistant mine superintendent; R. W. Burton, chief metallurgist; G. H. Grimwood, mill superintendent; and E. Lund, surface superintendent. The bulk of the output is consigned to Atlas Steels, Ltd., Welland, Ontario, and to the eastern United States, although some shipments have been made to Belgium, Holland, and England.

★Shipments of silver-lead ore to the Trail smelter were suspended for the winter on November 15th by Silver Giant Mines, Ltd., Golden district. A net profit of $7,274 on the first 18 cars paid all costs of labor, transportation, and loading. Returns from the last eight cars are expected to defray the cost of mechanical-loading equipment, trucks, lumber, and supplies and at the same time leave a fair measure of profit. Shipments from the dump will be resumed in 1948 when they will be augmented by ore from the mine in which development work is now in progress on the bottom level.

## YUKON TERRITORY

★To the end of September, gold production from placer operations during 1947 in Yukon amounted to 33,856 ounces. As in former years, the principal producer was Yukon Consolidated Gold Corporation, Ltd., which operated six dredges in the Dawson district. Clear Creek Placers, Ltd., operated its dredge on Clear creek with satisfactory results and partially constructed a new dredge on Thistle creek. Transportation difficulties, however, prevented completion of the job before the close of the season. Yukon Gold Placers, Ltd., an affiliated company, installed a dredge and com-

menced mining in August on ground on Henderson creek leased from The Yukon Consolidated Gold Corporation. The dredge is considered one of the most modern of its size in the world, carrying 66 buckets, each with a capacity of 4½ cu. ft. Yukon Explorations, Ltd., commenced dredging late in August on its ground on the Sixty-mile River and operated successfully until October 15th. Reno Gold Mines, Ltd., did preparatory work on Canadian creek.

★In the Whitehorse district Kluane Dredging Co., Ltd., introduced a new method of operation to Yukon, employing bulldozers, dragline, and floating washing plant. Burwash Mining Co., Ltd., also used heavy machinery in the same area. A portable concentrator for the recovery of fine gold was employed by William McComb on the bars of the Teslin river.

★To the end of August, Keno Hill Mining Co., Ltd., subsidiary of Conwest Exploration Co., Ltd., and Ventures, Ltd., produced silver and lead from the Hesta and Calumet mines valued at $349,024 after treatment of 1,414 dry tons of ore. The company is conducting development work on the Elsa and Silver King properties. Mayo Mines, Ltd., in the course of development of the Rio group on Galena hill, produced 90 tons of high-grade ore, assaying 130 oz. silver per ton and 75% lead. Yukon Northwest Explorations, Ltd., dropped its option on the Blue Rock group on Keno hill but retained options on properties on Galena hill. Brown McDade Mines, Ltd., suspended work on its 46-claim group in the Nansen-Victoria Creek area at the end of the season after driving more than 2,000 ft. of tunnel and several thousand feet of diamond drilling. It is planned to resume work in the spring of 1948.

★The Whitehorse copper belt has been restaked into 68 claims by B. Brynilsen for Noranda Mines, Ltd., and a three-year prospecting and geological program is being formulated to prove the zone.

★Hudson Bay Exploration and Development Co., Ltd., engaged in extensive diamond drilling on the BOM group on Seagull Creek and the ATOM group at Crescent Lake and built a road to these areas from Mile 722 on the Alaska highway. This company also applied for renewal of the 44 claims in the Logjam Creek area, which were drilled in 1945 and 1946.

## MEXICO

### Government calls convention to study mining's problems—New silver prospects in Durango

★The Mexican Government has called a convention for next March in Mexico City of mining industry employers and representatives of labor in order


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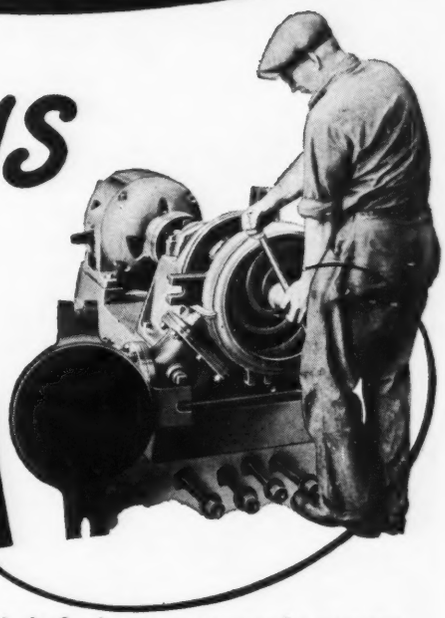

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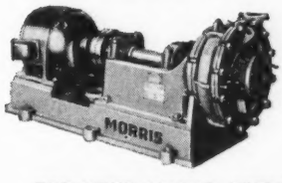


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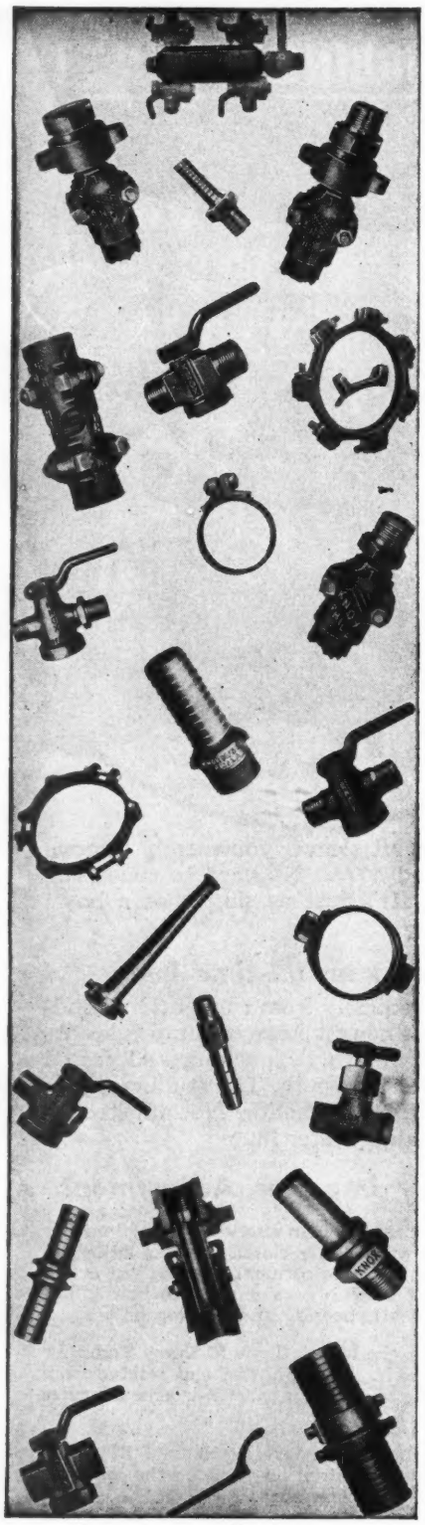

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## Mexico (*Continued*)

to discuss with government officials the best means of improving the status of Mexico's mines. The announcement said that the chief topics of discussion would be taxation, transportation, credit, mining and labor legislation, and operation of cooperatives. More than 1,000 delegates are expected to attend the meeting.

★Mining operators in Durango and Chihuahua are optimistic on the future of silver, and much prospecting is being encouraged as a result. Prominent in financing prospectors is Alfonso Burciaga of Durango City, who is aiding small miners to work new silver deposits found in Namiquipa municipality, Chihuahua, and silver and lead orebodies in the Promontorio region in Durango.

★The port of Tampico is reported to be suffering from diversion to Texas ports of metal exports destined for overseas shipment. Exporters are said to find it less expensive to ship concentrates out through Galveston or Corpus Christi. The Ministry of Finance is studying the situation.

## ARGENTINA

### Two uranium finds reported—Coal mine worked in Patagonia—Pirquitas mine shuts down

★Exploration conducted by the Direccion de Combustibles Solidos Minerales in southern Patagonia has proven the importance of the coal beds of Rio Turbio near the Chilean border. Five different coal beds have been located in Tertiary formations. To the present, drilling has blocked out about 100,000,000 tons of fairly good sub-bituminous coal, but the geological evidence suggests that the whole basin contains much more coal than that. A railway about 200 miles long will be built to move the coal to the port of Santa Cruz on the Atlantic. Small scale production has already begun, and coal is being trucked to the port of Gallegos.

★In 1947, two new deposits of uranium were discovered in Argentina, one in the Mendoza province, 20 km. from the capital city; the other in the Province of San Luis in the beryllium mine of Santa Ana, which belongs to the Berilio Argentina Co. Little is known about the extent of these deposits, the exploitation of which has been undertaken by the national government. Uranium was first found in Argentina about ten years ago in the Province of Cordoba. Recently technologists of the University of Cuyo have found uranium in the asphaltite and mineral oil of Tupungato, Mendoza.

★Mina Pirquitas (Picchetti y Cia.), the only important tin producer in the country, is closing down. Increasing costs and decreasing grade of ore have made operations unprofitable. Pirquitas has been running since 1933, reaching its peak production in 1938, with about 1900 tons of fine tin and 43 tons of silver.

★L. M. Piccardo y Cia. has opened a new 40-ton cyanidation plant at Marayes, San Juan. At Gualilan, in the same state, gold is being produced from an old tailings dump.

## CHILE

### Koppers to run new steel plant—Gold output up—Nitrate production satisfactory

★Cia. Acero del Pacifico of Chile, and Koppers Co. of Pittsburgh, Pa., announced on December 4 the signing of a basic contract by which Koppers will have supervision of construction, engineering, and management of the first integrated steel plant to be built in Chile. In a joint announcement, General Brehon Sommervell, Koppers' president, and Roberto Vergara, chief executive in the United States for Chile's Corporation de Fomento, said the new steel plant would be built at Concepcion on San Vicente Bay in southern Chile. Cost will be about $50,000,000. The plant is expected to be in operation by 1950; annual capacity will be about 250,000 tons of steel products. W. C. Snyder, Jr., a Koppers vice-president, will be in charge for the company at Concepcion. The U. S. offices of the Corporacion de Fomento are at 37 Wall St,. New York, N. Y.

★Chile produced more gold in 1946 than it had since 1941, the total being 230,600 oz., of which 124,500 oz. came in the form of bars from mines and placers, 84,200 oz. were combined in ores and concentrates, and 21,900 oz. were in Potrerillos converter bars. The gold placers had their best year since 1933, when more than 40,000 men were given work by the State in washing gravel for gold.

★Nitrate production in Chile for the first seven months of the year has amounted to 928,739 metric tons, an average of 133,000 tons per month, which can be considered satisfactory. Production could have been still larger had it not been for communist-inspired strikes in the nitrate fields. Iodine production is now running about 139 metric tons per month.

★Bethlehem Chile Iron Mines at El Tofo has produced 1,010,781 metric tons of ore from January to July inclusive, a rate of 144,500 metric tons per month. Grade runs about 62% metallic iron.

★Copper production in the three large Chilean copper mines for Janu-

ary through September has run as follows: Chuquicamata, 169,194.242 metric tons electrolytic; Potrerillos, 32,338.959 tons blister, 12,229.365 tons electrolytic; Braden, 102,008 tons of fire-refined.

## PHILIPPINES

**Gold output steadily climbing—Chromite shipments up—Atok to merge with Big Wedge**

★Value of mining production in the Philippines for the first six months of 1947 has been officially estimated at over $4,150,000. This has been subdivided as follows: copper, $1,968,188; chromite, $864,500; gold, $678,661; coal, $448,574; manganese, $198,240. The large figure for copper does not represent new production, but is rather shipments of concentrate from the Lepanto mine that had been left there by the Japanese.

★These same figures for the second half of the year will show a different apportionment. Gold output has been steadily climbing, with the Big Wedge mine now back at its pre-war rate of about $220,000 monthly. Surigao Consolidated has expanded its mill and is expected to double its present rate of $42,000 monthly. Mindanao Mother Lode and the new Benguet-Balatoc mill are expected soon to add substantially to gold output.

★Chromite shipments from Masinloc mounted to 20,000 tons in October, and a goal of 22,000 was set for November. Several large mining companies now have parties in the field in the Zambales and Cagayan areas looking for chromite and manganese.

★Work on the new Lepanto mill is progressing, but no production of copper concentrate is expected before April, 1948. No plans have been made to rebuild the smelter, and the copper concentrate will probably go to the United States for treatment.

★Merger of Atok Mining Co. and Big Wedge Mining Co. has been ratified by the stockholders. A new company will be formed immediately, with increased capitalization to provide for expansion and to enlarge present mill capacity.

## CYPRUS

**Mining recovering gradually—Gold deposit sought—Pyrite and copper shipments increase**

★Mining in Cyprus is gradually recovering from the almost complete shutdown of the war years. Principal mineral products exported are: pyrite (in part cuprous), copper concen-


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## Cyprus (*Continued*)

trates, and asbestos. Chromite, gypsum, and umber are of lesser importance. Total value of these exports in 1946 was double that of 1945, and it is expected that 1947's exports will double those of 1946. This would surpass the maximum pre-war year of 1938, when exports totaled nearly £1,500,000. Quantities of these products will not be as great as in pre-war years, however.

★Most serious delays at present are in getting new equipment and spare parts. Mine labor is still short, with only 3,366 men employed in 1946 as against 9,200 in 1938. Wages have increased from an average monthly wage per man of £4 in 1938 to £9 in 1946. The labor shortage and high wage have caused most companies to seek more ways of mechanizing their operations.

★Gold mining seems to have been a casualty, although the gold boom of pre-war years was already subsiding when the war began. Most deposits were found to be superficial gossan ores overlying massive pyrite deposits, and good grade ores were soon exhausted. Several companies still possess substantial quantities of lower grade ore, and one company is now drilling in an attempt to develop ore enough to warrant building a mill. The gold ores are hard to treat because they have a high proportion of slimes and also contain much water-soluble salt, including some copper.

★Cyprus Mines Corporation, the largest operation on the island, resumed production in May, 1946, and is making regular shipments of pyrite to Europe and copper concentrate to Hamburg. Their Mavrovouni mine is averaging 1,700 long tons per day on a two-shift basis. The ore averages about 48% sulphur and 4% copper. The company is looking for new deposits, and has had Oscar Weiss send a gravimeter crew from Johannesburg to help in the search.

★The Hellenic Co., of Chemical Products & Manures, Ltd., has engaged the same geophysical firm for some exploration work. The company is drilling their mining lease near Kalavassos near the southern coast of the island. About 106,000 tons of pyrite were mined from their two developed deposits in 1946, and production will probably go higher in 1947. The ore does not contain enough copper to make it worth recovering.

★It is understood that National Mining Corporation of London, after an examination by a consulting engineer in 1946, decided to participate in the affairs of Cyprus Sulphur & Copper Co., Ltd., which leases the ancient Limni mine. Churn drilling is in progress to attempt to prove up 1,000,000 tons of 4-dwt. gold ore, that is also believed to carry about 1 oz. silver, 28% sulphur, and a little copper.


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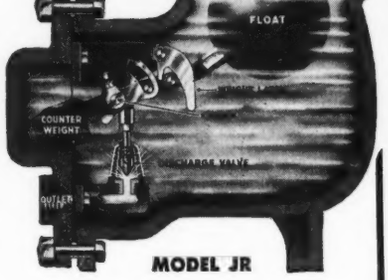


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★Tunnel Asbestos Cement Co., Ltd., operates a quarry asbestos mine in the Troodos mountain range. During 1946, 366,200 tons of rock was quarried and 4,566 tons of fiber was produced.

★Cyprus Chrome Co., Ltd., expects to bring their gravity concentrator into operation before the end of the year. At present hand-sorted ore from dumps is going to Sweden. A 300-ft. raise is being stripped for hoisting in preparation for renewal of underground mining. The shaft connects with a gravity ropeway to the concentrator at Kakapetria, from which the ore and concentrates are trucked 14 miles to the head of the government railroad and shipped from the port of Farmagustis, about a 70-mile haul. Sorted ore and concentrates run about 46-48 $Cr_2O_3$, with a chrome-iron ratio of 2.8. In 1946, 1,140 long tons was exported and it is hoped to raise this production to about 10,000 long tons annually. Exploration drilling is done with tungsten carbide bits. One rig only is used.

## INDIA

### Ooregum shows loss—New laboratory near Tata—Steel shortage still acute—Copper wanted

★The Central Legislature will soon receive from the Government Council of Scientific and Industrial Research an atomic energy bill, which will authorize collaboration with other countries in research and development of atomic power for peaceful purposes. Dr. S. S. Bhatnagar, government research chief, has stated that natural resources available in India for atomic power, notably the monazite sands of Travancore, compare favorably with those of any other nation in the world.

★Messrs. John Taylor & Sons, London, announce that the Ooregum mine in the Kolar gold field, Mysore State, failed to show a profit for the fiscal year of 1946-47. Taylor also states that the company has proposed wage increases that will raise the total pay for Kolar workers to about two rupees, 11½ annas per shift, or roughly 95c. The increase amounts to about 14c. Of the total, about 72c. will be in direct pay.

★Establishment of a National Metallurgical Laboratory at Jamshedpur, site of the Tata Iron & Steel Works, has progressed a step further with the news that Dr. Sachs of the Case School of Applied Science has been selected for the directorship.

★India has reached self-sufficiency in production of brass and copper alloys, rods, and bars and will soon meet her requirements of sheet and strip, according to the Indian Non-ferrous Metals Manufacturers Association.


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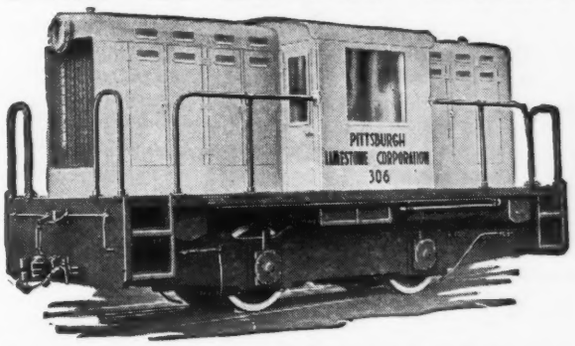


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**. . . the story of the metal that nature forgot to finish**

By

**June Metcalfe**

Member, Society of Woman Geographers; Associate Member, American Institute of Mining and Metallurgical Engineers

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- Aluminum Is Originated
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- Which Is "Pay Dirt"?
- Mapping a Mine
- Bauxite Mines Circle the Globe
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## India *(Continued)*

However, the association points out that the position is actually insecure because India must import all the copper that supplies these plants. The group asks for establishment of local smelters and development of mines, and for government buying of copper on a quota basis from other countries, leaving local purchase of metal within those quotas to local industry.

★Iron and steel continue in such short supply in India that at least one province, West Bengal, has given up trying to ration its supplies. Faced recently by an accumulation of 40,000 applications for the 2,515 tons of steel allocated to the province for the first quarter of 1948, the local government has decided to parcel out the steel by public lottery to avoid charges of graft or favoritism.

# AFRICA

**Blyvoor will increase tonnage—Welgedacht to resume—More high values from OFS boreholes**

★Welgedacht Exploration Co., Ltd., which suspended operations on the East Rand from December 1939 to November 1946, hopes to start milling on a small scale in December. Estimated tonnage is 25,000 tons per month by February or March next year. When the mine shut down in 1939, ore reserves were estimated at 489,300 tons, valued at 4.45 dwt. over an estimated stoping width of 37.6 in.

★Blyvooruitzicht Gold Mining Co. is planning to increase its output to 120,000 tons a month, and it intends to raise the money to do it (about £3,700,000) by an issue of shares to its shareholders. The new program will involve sinking and equipping two underground vertical shafts about 2,500 ft. from the 6th level on down to hoist ore from the 22nd level. Also planned are sinking and equipping of five inclined shafts from the 6th to the 14th level, expanding reduction plant and workshops, building more housing, and increasing hoisting capacity of the main shafts. At the end of October, Blyvoor had sampled a total of 4,055 ft. of development work, all classed as payable, with an average value of 53.5 dwt. per ton over a reef width of 10 in.

★High values have again been reported from the drills working in the Orange Free State. The first was from the farm, van den Heever's Rust, about four miles northwest of Odendaalsrust, where borehole VDH-1 is being put down by Middle Witwatersrand, Ltd., on joint account with General Exploration, Ltd. At depths of around 5,000 ft., the drill cut nine different bands of conglomerate, two of which yielded assays the equivalent of 1,652 and 1,365 in.-dwt., respectively. Others ran from 43 in.-dwt. to 500 in.-dwt. The six richest, and lowest, bands of conglomerate have not yet been correlated with other known gold-bearing formations in the O. F. S.

★Another high value of more than 1,100 in.-dwt. for a Free State borehole was announced during November. This one came from Middle Witwatersrand again, this time from hole H-1, drilled on joint account with New Union Goldfields on the farm, Harmony 222, 2½ miles northwest of Virginia. Basal Reef, strongly developed, was cut at 4,218 ft. assaying 20.9 dwt. over a corrected width of 56.4 in. (1,179 in.-dwt.). The Leader Reef, the "A" reef, and the "B" reef were all intersected with negligible results.

# AUSTRALIA

**Wage increase sought may cripple gold mines—Big Bell looks better—Mt. Isa to build new plant**

## WESTERN AUSTRALIA

★A case now before the State Arbitration Court may have far-reaching influence upon the gold mining industry. The miners' union is claiming a 40-hour week for surface workers and a 35-hour week underground; in addition, an increase in the industry allowance from 12s. to 24s. per week is claimed, as well as an increase of 96% in all margins. Five craft unions have also made claims for considerable all-round increases. In opposing the claims it has been stressed that if these are granted, two-thirds of the mines now working in the state will be forced to close down; operations by the remaining one-third would be so restricted by selective mining as to shorten seriously the life of those mines. Large low-grade ore deposits which are now being examined would be abandoned and, instead of the industry employing many additional men as is hoped at present, large numbers would lose employment. If the claims are granted, the additional cost to the industry will be £A1,200,000 per year; dividends paid last year totaled only £A464,000.

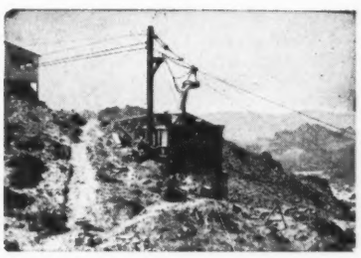
Of fifteen operating companies, three only will be able to work profitably at the present price of gold; the rest will be forced either to close down or to curtail operations very severely. The threat to the industry is serious, and particularly at this time when the state government and the mining companies are making strong efforts to increase production, and the gold tax has been removed by the commonwealth government. Improvement in production since the end of the war has been slow due to inadequate labor, and scarcity of stores. For the

nine months of the present year, to September 30, the mines of the State have produced 524,592 fine oz., which compares with 443,123 fine oz. for the same period of 1946, and 354,077 fine oz. for the corresponding period of 1945. The figures for the year, so far, represent about 60% of the pre-war rate of output.

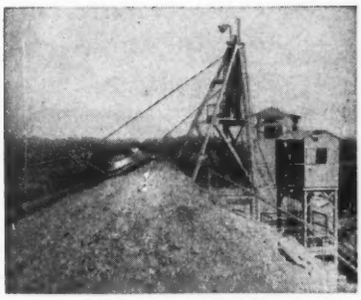
★North Kalgurli (1912) Ltd., one of the large mines of the Kalgoorlie goldfield, treated 129,283 long tons of ore in the last financial year for the recovery of 42,386 fine oz. of gold. The grade of ore mined was 6,557 dwt. gold per ton. Development is reported satisfactory and a considerable tonnage of ore of good grade has been opened up during the year.

★Operations by Big Bell Mines Ltd., at Big Bell, northwest of Cue, continue interesting. The mine was closed down during the war, and resumption was delayed by the failure of the Commonwealth government to return or replace machinery acquired from the company for war purposes. Normal mine and plant capacity is 40,000 tons of ore per month, and the present rate of through-put is 32,000 tons of ore assaying 2.8 dwt. gold per ton. An additional Diesel engine of 1,100 h.p. is being erected, and when completed, the normal rate of production is expected. The orebody is 1,500 ft. long and 100 ft. wide. The main shaft has just been completed to a depth of 1,000 ft. and a level is being opened out at 800 ft. The method of mining is sub-level caving, and ring drilling was introduced prior to closing down. The company is examining other localities of interest and is carrying out large scale exploration on the main line of lode at Meekatharra to the north. This line of lode was worked for many years with considerable success, and particular attention is being given to the southern end where ore occurrences were short, narrow, and high grade, and may overlie much larger orebodies of lower grade. An announcement has just been made that the company has taken up a prospecting area at Labouchere Range, in the Peak Hill country, about 100 miles north of Meekatharra. The deposit is stated to be large and the grade low.

★There have been satisfactory developments on the new goldfield at Coolgardie, 26 miles west of Kalgoorlie. Following the purchase of the Barbara group of leases by Western Mining Corporation Ltd., this company has now exercised its option to purchase over the Surprise group of leases, on which extensive exploration has been carried out. It is expected that a company will be formed by Western Mining, to work the newly acquired group, on which an ore reserve of 70,000 tons of ore with an assay value of 13.4 dwt. gold per ton has been proved by the work so far completed. One of the old auriferous lines of the Coolgardie field, the Burbanks line, has been taken up by the corporation. The leases are close to the Surprise group, and exploration will be commenced with little delay. It is probable that the attention now being given to this old field may result in further discoveries, either in new ground or in the vicinity of the abandoned workings.

A 20 h.p. Sauerman Slackline Cableway operating a small bucket on 1,000 ft. track cable, reclaims tailing from dump in valley to bin on hillside above mill.



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★Gold Mines of Kalgoorlie Ltd., working a group of leases on the eastern side of the Golden Mile, Kalgoorlie goldfield, has reported that in the 1946-1947 period of 12 months, 156,502 tons of ore was treated for the recovery of 36,208 fine oz. of gold. Proved, broken and probable ore is estimated at 547,978 tons with an average assay value of 5.2 dwt. gold per ton. Development work is reported as being satisfactory and recently rich ore has been located on the Iron Duke lease, at No. 3 level. After intersecting the lode in the crosscut, driving north has advanced 36 ft. in ore assaying 31.8 dwt. gold per ton over a width of 60 in., but 28 ft. of driving south is in low-grade ore. The downward extension of this lode has been located by diamond drilling at a depth of 150 ft. below the No. 3 level; values are reported as 24 dwt. over a width of 32 in.

## TASMANIA

★An advance report of mining operations by Mount Lyell Mining and Railway Co. Ltd. for the year ended September 30, 1947, shows that the tonnage of ore mined closely approximated that raised in the previous period. Comparative figures for 1946 and 1947 are given below:

| Year ended September 30: | 1946 | 1947 |
|---|---|---|
| Ore treated; tons | 1,468,825 | 1,462,461 |
| Blister copper produced; tons | 8,203 | 8,273 |
| Containing: copper; tons | 8,143 | 8,208 |
| silver; oz. | 29,630 | 30,313 |
| gold; oz. | 5,486 | 5,712 |

The company operates an electrolytic refining plant and for the year to September 30, 1947, produced 8,175 tons of cathode copper. The ore, as mined in the open cut, has an average head value of approximately 0.7% Cu, and is sent to the concentrating plant, only 2,512 tons being direct smelted. The concentrating plant produces copper concentrate for the blast furnace, and pyrite concentrate, assaying 50% sulphur, which is shipped to sulphuric acid manufacturers on the mainland, much of it going to the Mount Lyell companys' own works for the manufacture of superphosphate, which is an important secondary undertaking. For some time the company has been steadily increasing the rate of output and has been adding to mining, transport and milling plant to permit the mining and treatment of larger tonnage of lower grade ore, the average grade having dropped from 1.1% copper to 0.7% copper. The estimate of

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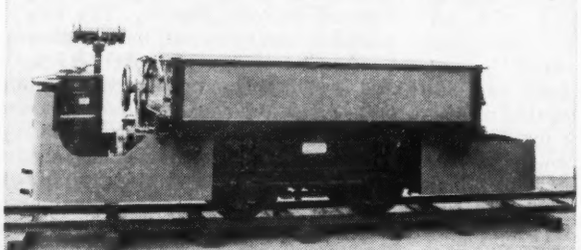

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## Australia (*Continued*)

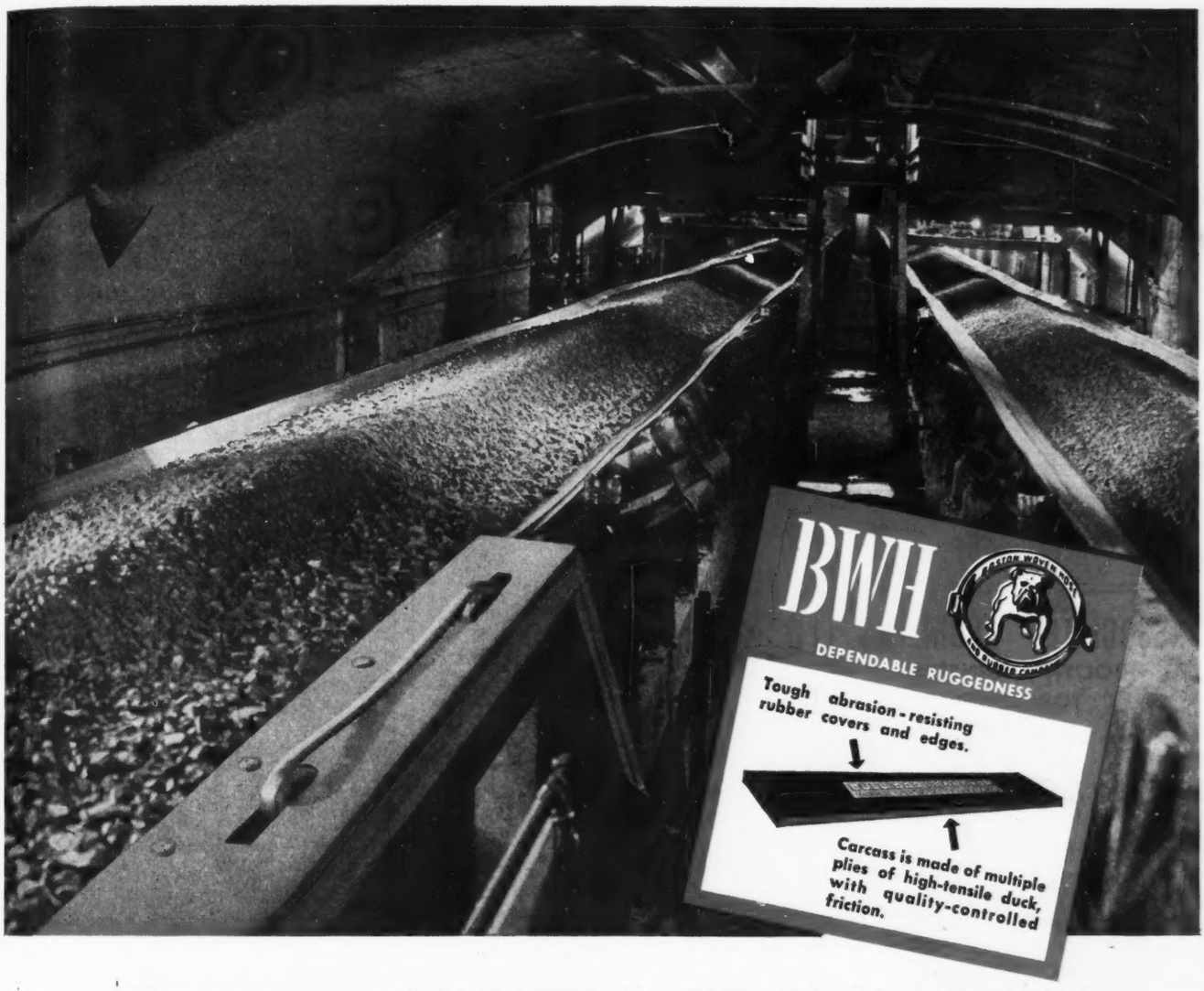
ore reserves at September 30 is not yet available, but that at the close of the previous year gave a tonnage of 34,000,000 available for mining.

### NEW SOUTH WALES

★An impressive example of government control of industry is given by the Coal Cliff colliery. This mine which, under company control, had been worked profitably, was taken over by the commonwealth government in March, 1944, and in a period of three years to March 31, 1947, the total loss under government administration amounted to £A108,023 despite the fact that the selling price of coal was increased. It is also noteworthy that during this period, absenteeism was considerably higher on this mine than on any other colliery on the South Coast coalfield. The mine was eventually handed back to its owners on March 31 last.

★North Broken Hill Ltd., whose property is at the northern end of the Broken Hill line of lode, made a net profit of £A1,137,436, after providing £A749,000 for taxation and £A75,000 for depreciation, in the year ended June 30, 1947. Profit for the previous year was £A461,670. Main reason for the increase is higher metal prices, assisted by a larger proportion of metals realized, improved metal recoveries, and a larger return from investments. Of the total ore mined, 230,302 tons came from the North section; 75,556 tons from the British, and 11,585 from the Junction section. Assay value of ore from the North section was: Lead, 15.1%; silver, 7.9 oz.; zinc, 12.6%. Assay value of ore from the British section was: Lead, 11.1%; silver, 6.5 oz.; zinc, 8.7%. Ore treated totaled 348,568 tons with a head value of: Lead, 14.1%; silver, 7.6 oz.; zinc, 11.6%. Metal recoveries were: Lead, 97.0%; silver, 91.8%; zinc, 86.9%. The lead recovery was the same as in the previous year; the recovery of silver was 0.3% higher, and that of zinc was 0.4% higher.

Output of ore is still below normal, the figure in 1941 being 511,620 tons, and in 1942, 501,084 tons. Subsequent production decreased through withdrawal of men for war purposes. The supply of general labor in 1947 was sufficient for requirements, but shortage of skilled miners continues. There was difficulty in obtaining machinery, and as a result, changes in surface and underground mechanical equipment have been considerably delayed. Ore reserves were estimated at 5,174,000 tons, an increase of 63,000 tons on the figures for the previous year. Development work for the year totalled 9,682 ft. compared with 6,799 ft. in 1946. The basic wage for the year averaged £A6-3-10 per week, and the lead bonus received by employees was at an average weekly rate of £A5-12-7, making an average weekly minimum earning of £A11-16-5.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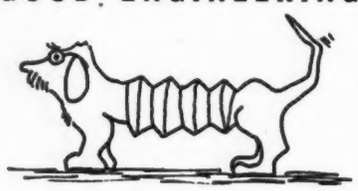

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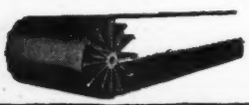

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## Equipment News

(*Continued from page* 101)

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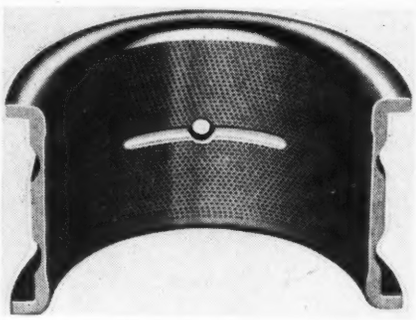
Magnetic Engineering and Manufacturing Co., Clifton, N. J., announces a complete line of permanently magnetized magnetic separators, including magnetic pulleys, drum, spout, and suspended magnets, and other types of standard and special designs. This supplements their complete line of electro-magnetic equipment, and the same design and construction principles, based on 30 years' experience in magnetic separation, are applied in both lines.



GRIDDED, centrifugally-cast lead-tin bronze bearings, like the one shown above, are now easily made by a new process worked out by National Bearing Division, American Brake Shoe Co., St. Louis 10, Mo. For details of the advantages of such bearings for heavy-duty service, write the manufacturer.

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(*Continued on page* 134)

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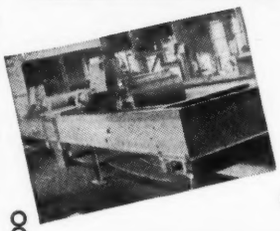

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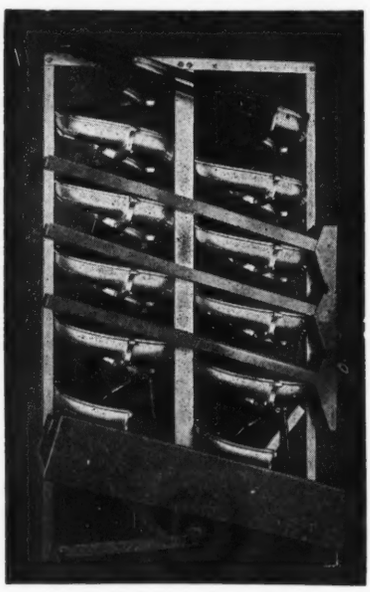

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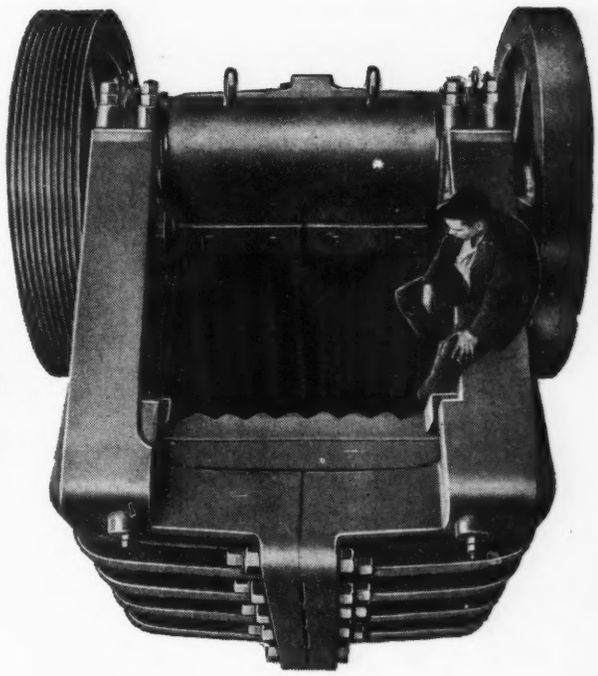

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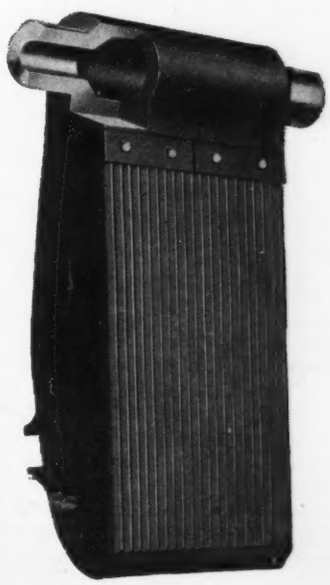

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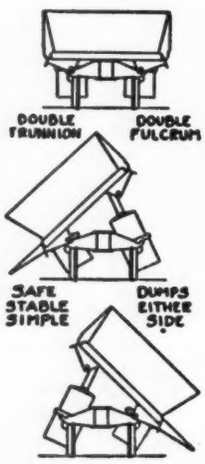


DIFFERENTIAL AIR DUMP CARS ● MINE CARS ●
LOCOMOTIVES ● ROCK LARRIES ●
HAULAGE SYSTEMS
DIFFERENTIAL STEEL CAR CO. FINDLAY, OHIO

## University of Washington Makes Changes, Appointments

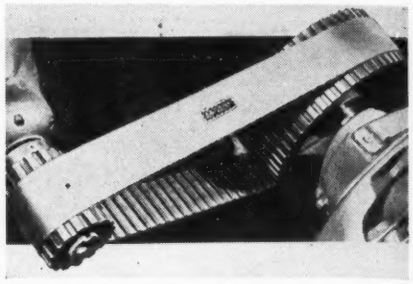
The College of Mines of the University of Washington has been renamed the School of Mineral Engineering, to better indicate the nature of the field encompassed in the School's curricula. The following faculty appointments have been made: Dr. R. W. Sandelin, associate professor of metallurgy; H. Gordon Poole, associate professor of mineral dressing; George B. Eyerly, assistant professor of ceramic engineering; Donald Anderson, instructor in mining engineering. Mr. Anderson is also in charge of special classes in prospecting offered as an adult education course for persons not in regular University attendance.

Dean Milnor Roberts has retired from active faculty duties after 46 years as head of the College of Mines, and has been appointed Dean Emeritus. In his honor, the Mines Laboratory has been renamed Milnor Roberts Hall.

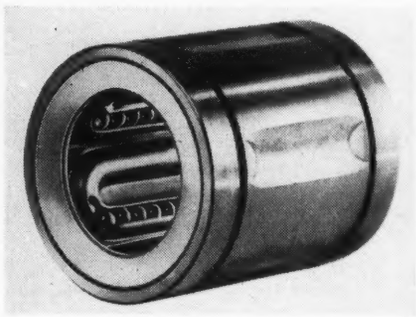
Drury A. Pifer, formerly mine manager for DeBeer's Consolidated Mines, Ltd., Kimberley, South Africa, has been appointed Acting Director of the newly-named school.

## Equipment News

(*Continued from page* 132)



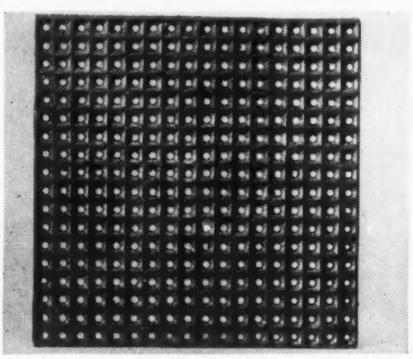
RUBBER TEETH in this belt keep it from slipping on the special grooved pulleys. Made by Gilmer Division of U. S. Rubber Co., Rockefeller Center, New York, N. Y., the belt is reinforced with steel cables, is highly flexible, and virtually noiseless.



BALL BEARINGS for linear or reciprocating motion are now offered by Thomson Industries, Inc., 1029 Plandome Rd., Manhasset, N. Y. Available for shafts of 1/4, 1/2, 3/4, and 1 in. diameter, the new bearings will be made in larger sizes as soon as tooling is completed.

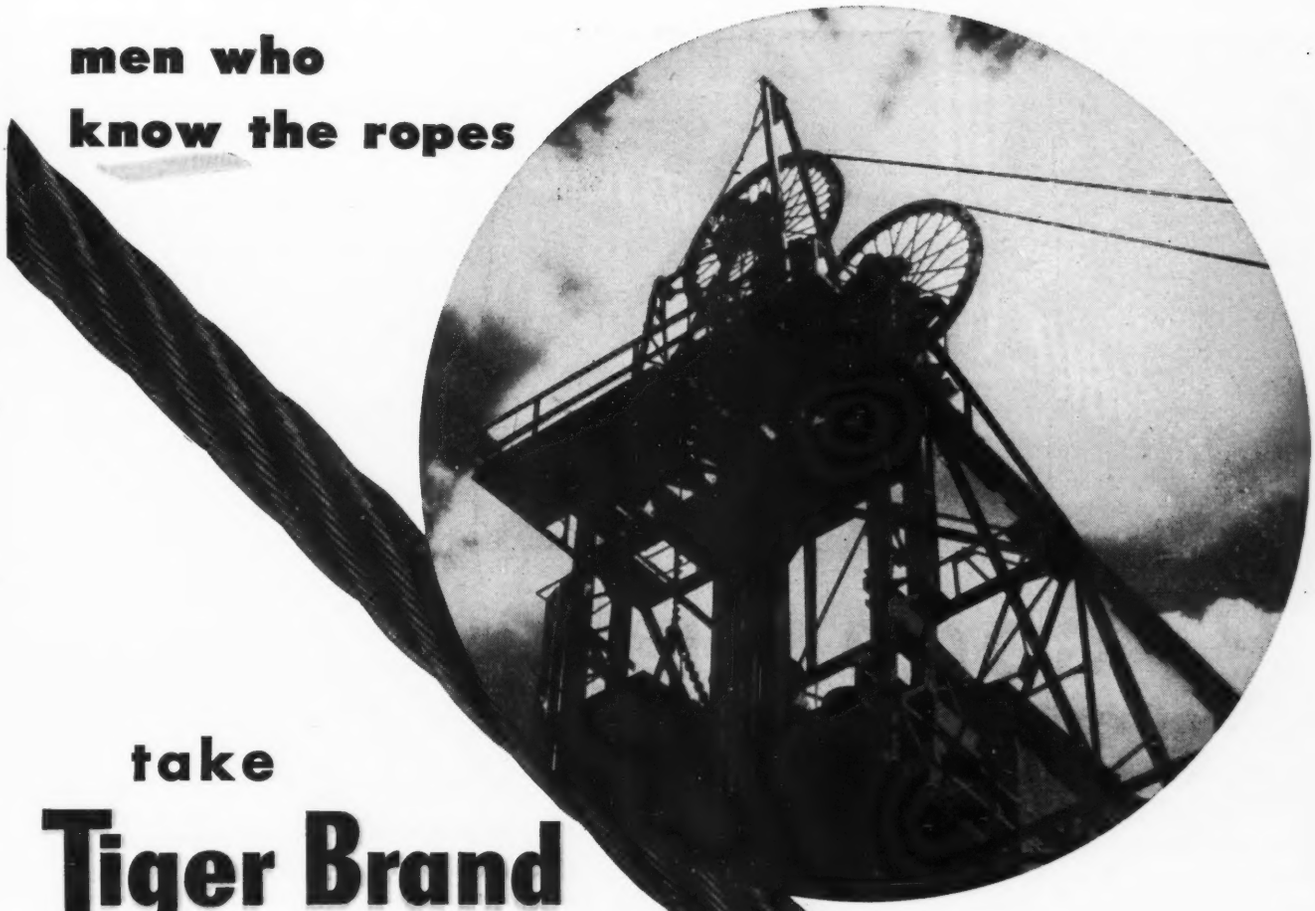
## Filter Backing Plate

Round-hole plate used to back up filter cloth loses a lot of the open area of the filter. A maximum open area is said to be provided by a new Pyramid backing plate now being offered by Pyramid Industrial Screen



Co., 1121 East 37th St., Brooklyn, N. Y. As shown in the photograph, the Pyramid plate consists of pyramid-like depressions, which allow filtration over an area possibly twice as great as in some standard backing plates.

men who
know the ropes



take
# Tiger Brand
every time!

● And, it's easy to see why . . . because U·S·S American TIGER BRAND Wire Rope possesses not just one or two, but *all* of the qualities needed to insure smooth performance, low-cost maintenance and long service life! Made to close tolerances and unvarying quality standards from the finest high tensile strength steel wire, TIGER BRAND combines strength, toughness, and flexibility to your greatest advantage. You can't buy better wire rope at any price! Immediate delivery of all sizes in either Excellay Preformed or non-preformed construction. See your supplier today. *Don't get caught with your lines down!*

**AMERICAN STEEL & WIRE COMPANY**
*Cleveland, Chicago and New York*
**COLUMBIA STEEL COMPANY**
*San Francisco*
Tennessee Coal, Iron & Railroad Company, Birmingham,
*Southern Distributors*
United States Steel Export Company, New York
**UNITED STATES STEEL**

EXCELLAY PREFORMED

**THE BIG DEMAND IS FOR TIGER BRAND**

# GOODALL "SSS" Conveyor Belting

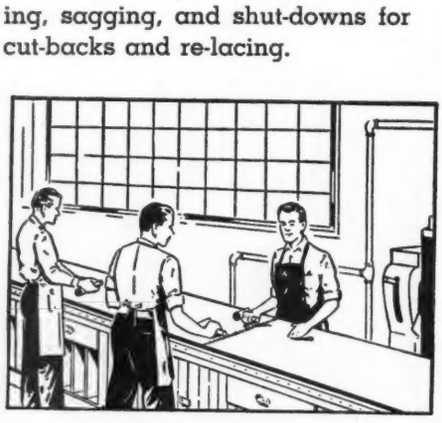
The belting you can rely on for long, trouble-free service in handling ores, run-o'-mine coal, rough slag, crushed limestone and similar materials, wet or dry. Made to put up a longer fight against the four principal elements in belt fatigue and failure:

**1** Exceptional resistance to friction wear against rollers and pulleys.

**2** Strength to carry heaviest loads, *longer*, without stretching, sagging, and shut-downs for cut-backs and re-lacing.

**3** Highly resistant to shock and abrasion occurring at loading point.

**4** Balanced construction withstands constant flexing over pulleys without affecting the friction between plies or "spreading" the top cover.



Building Goodall Conveyor Belting is a very personal matter with several Goodall men. They've been at it a long time; and while certain operations, such as curing, are mechanized, their expert craftsmanship and traditional pride are all-important factors in maintaining the high standard of quality for which "SSS" and other Goodall belts are famous.

*Contact our nearest branch for details and prices.*

**GOODALL RUBBER CO., INC.**

**THE GOODALL-WHITEHEAD COMPANIES**

**Philadelphia • Trenton • New York • Boston • Pittsburgh • Chicago • St. Paul • Los Angeles**
**San Francisco • Seattle • Salt Lake City • Houston • Factory: Trenton, N. J. • Est. 1870**

## Books *(Continued)*

wealth and poverty, violence and friendliness. It is unquestionably a readable book about a region of tremendous importance to everyone in the United States, as John L. Lewis has been able to demonstrate.

Mrs. Sheppard is the wife of a mining engineer, and she knows the people of this region intimately. In her introduction she says that she is neither pro-labor nor pro-management, but only pro-people. The book seems to bear out her statement. She obviously has sympathy for those who work in the coal mines and for those whose job it is to try to keep those mines running safely and profitably. She does not seem to be out to prove anything, but only to tell a story so that her readers will better understand the people they read about in the newspapers whenever the United Mine Workers begin to negotiate another contract. We liked it.

**GUIDE FOR REDUCING FUEL CONSUMPTION IN COMMERCIAL PLANTS.** Published by U. S. Bureau of Mines as Bulletin 466, available only through Superintendent of Documents, U. S. Government Printing Office, Washington 25, D.C. Price, $0.50.

Combined in this single publication are all the ideas used in the wartime National Fuel Efficiency Program, which resulted in saving millions of tons of coal annually, as well as proportionate savings in other fuels. The material is divided into seven groups: combustion equipment; draft and combustion air; instruments and controls; pumps, traps and valves; cleaning and miscellaneous; heat utilization and distribution; prevention of heat losses.

**SOIL MECHANICS.** By Dimitri Krynine, Lecturer in Civil Engineering, Yale University. Published by McGraw-Hill Book Co., New York, N. Y. Pp. 511. Price, $5.50.

Anyone who has anything to do with building or maintaining earth structures such as fills, dams, or retaining walls must certainly find something of value in this book, however great his experience in this work may have been. This statement will include practically all mining engineers, because earthworks of various kinds have always been made use of in mining operations.

The chapter on stability of cuts and embankments is full of good material that should help avoid mistakes, and there is much new material on design of highway and runway subgrades.

It is true that much of the material is rather elementary because the book is, after all, a textbook; yet the subject is a definite part of mining activity that has just as definitely been neglected in many mining curricula. For that reason the book probably merits a place on the bookshelf of any mining engineer.

# DORRCO DOINGS IN 1947

Our first year of bi-partisan control since 1933 has passed and brought the first evidence that the labor road is not a "one way street" and that the American people, through their representatives, can rebel against excesses. Every evidence today indicates this is as satisfactory to labor's rank and file as to John Q. Citizen. Elimination of price control, however, with the greatest excess profits going, not to big business, but to the nominally-unorganized farmers, puts the second of our specially-privileged classes in the limelight.

Our country has been united on foreign policies. The great advance of the year has been recognition of the world-wide struggle between an active, controlled ideology, which feels that to survive it must spread, and a brand of Democracy that believes individual freedoms and spiritual standards are worth fighting and living for, and that the power of spirit and good will must triumph in the end. For the "practical" man, an increase in output of over 25 percent at the Victoria Coal Pit in Staffordshire, England, speaks for itself and is credited by the union head to a new spirit of honesty and unselfishness inspired by the "Moral Re-Armament Group."

* * *

**ORGANIZATIONAL**—Much has been done to improve our "inner workings" and to resume our world-wide coverage in present and anticipated fields.

The Dorr Company really started when, while doing engineering work, the Classifier and Thickener were developed. During the past forty years, much consulting work has been done in our specialized fields. This work has now been formalized by our establishing a Consulting Engineering Department, to focus and make available over 40 years of experience throughout the chemical and metallurgical worlds.

Work of this type exceeded our previous peak year and covered a broad variety of projects, ranging from preliminary studies and economic analyses, through laboratory and pilot plant investigations, to the design and specification of complete plants.

**FLUOSOLIDS**—The roasting of arseno-pyrite gold concentrates for cyanidation on a commercial scale is now a reality and small scale work in similar fields gives promise of success. A pilot plant operation on a crystalline limestone, in which many unexpected problems were overcome, has resulted in plans for a 100 ton commercial plant, now in the design stage.

**CHEMICAL PROCESSING**—We have collaborated on plans for the conversion of numerous war-born plants and techniques to peace-time economy, including processing improvements and expansions in such diverse fields as alumina, magnesia, titanium, potash, phosphates and catalysts. Abroad, the highlight was an order for 36 major equipment units to convert the chief Alsatian potash plants from leaching to froth flotation.

**CEMENT**—Continued activity both here and abroad has been evident. Two new American plants have installed our closed circuit grinding system, and three others have enlarged and improved existing plants with Dorr equipment. Abroad, the further acceptance of Dorr C.C.G. and the thin slurry process has been indicated by equipment supplied for North and South Africa, China, Chile and Mozambique.

**HIGH SPECIFICATION SAND**—Our service to this field was highlighted by a complete Dorr installation in the Northwest, the solution of a special silica sand problem in California and the equipping of a barge on the East Coast for an entire sand and gravel washing and grading operation.

**CHEMICAL PULP**—Our score this year was five continuous recausticizing systems for new chemical pulp mills with an aggregate output of 700 tons per day, plus additional equipment for the modernization or expansion of four other mills.

**SUGAR**—Cane sugar managements have continued the major overhauling of factories neglected since 1930 and in this rehabilitation the use of Dorr Multi-feed Cane Juice Clarifiers and Oliver-Campbell Cane Mud Filters has been conspicuous. Beet sugar manufacturers continue their demand for more Dorr equipment, with the accent on our De-Ionization System.

In England we started up this year a mud disposal plant to utilize, for land-building purposes, the mud washed from sugar beets. We have an order for another for the same purpose in Hawaii.

**DE-IONIZATION**—Milestones in the rapid progress of D-I have been the successful initial operation of two large units in the sugar and syrup industries and the erection of our first beet sugar pilot plant abroad. In Hawaii, at one plant, D-I is producing an edible sugar syrup, equivalent to an additional recovery of 8,000,000 pounds of sugar per year. Another D-I, at a large beet sugar factory, is expected to increase the sugar extraction 10 percent.

**SANITATION**—The year saw the first signs of the long-awaited upturn. Our major projects were equipment for San Diego's novel sewage plant; for Oklahoma City's two new sewage plants (one a 25 MGD biofiltration plant, the world's largest); and, for the Sanitary District of Chicago, replacements for 8 special Dorr Clarifiers, now 20 years old and obsolete.

In the water field, large installations of Dorrco Flocculators are being made at Washington, D.C., and Dallas, Texas; while, in active Latin America, we are modernizing one section of the Buenos Aires' water plant at Palermo and equipping that city's Ezeiza Airport with modern biofiltration sewage treatment facilities.

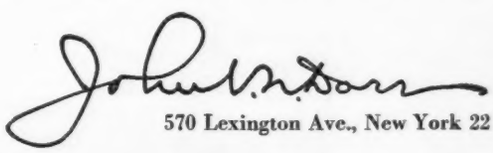
**MACHINE DEVELOPMENTS**—The year's major machine developments include a new clarifier design; a rapid-mix, externally-heated digester; a heavy-duty hydroseparator with automatic, hydraulic lifting device; a two-stage clarifier and two-stage biological filter; a launder for feeding sedimentation units radially; and a method of controlling the pH of mud in cane juice clarifiers.

* * *

The year has seen much progress with us in quiet ways, with shipments and orders balancing on the largest scale in our history. The successful operation of several important plants in our new fields has emphasized the need of staff additions.

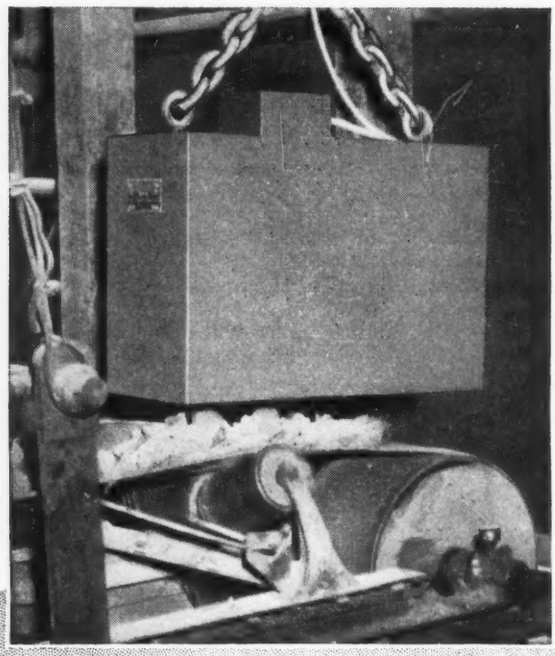
My own journeys included a semi-vacation trip to my "Country of Origin", the Black Hills, with my brother, who last visited there fifty years ago, and a motor trip home via Red Lake and Ontario. Others have carried the major load of travel and report from the Philippines, South America, India, South Africa and Europe a strong will to go ahead and a belief that we shall conquer the threats to world peace that now lie ahead.

To our friends and our associates everywhere, we send New Year's Greetings in a spirit of faith that, while the past year has clarified world problems, 1948 will see the most important steps toward their solution.



570 Lexington Ave., New York 22

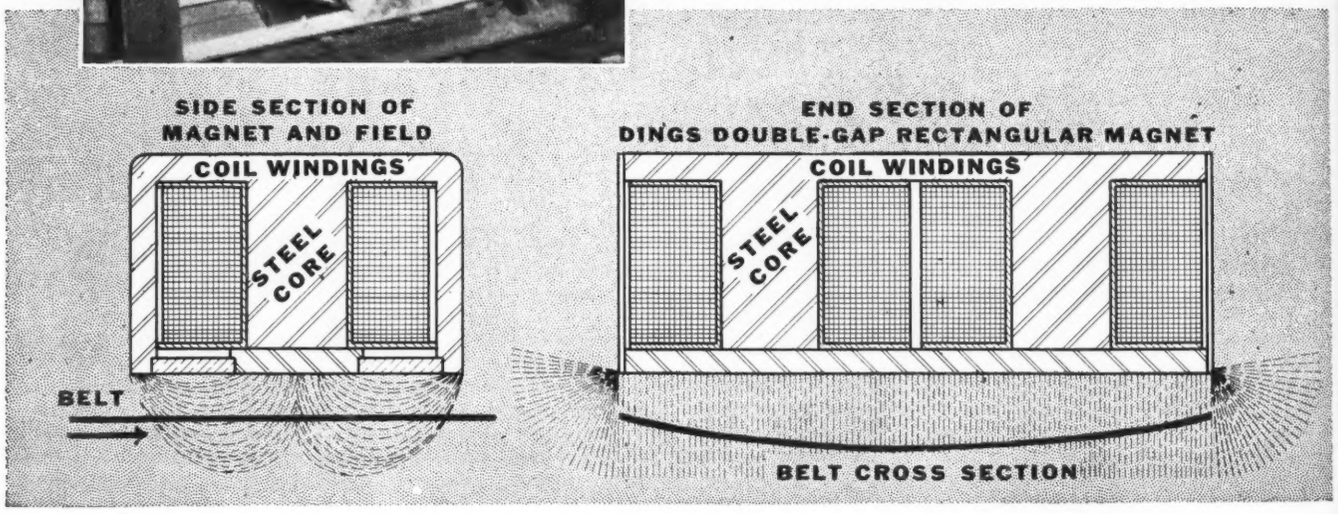
DORRCO



# *Full range magnetic power*

## with Dings Rectangular Suspended Magnets

*Left*—Install Dings Rectangular Magnets over, or at the end of conveyor belts. Full range magnetic power covers entire belt width—gives powerful edge-to-edge protection against tramp iron.




DINGS Double-Gap Rectangular Magnets give you full range protection against tramp iron by putting a powerful uniform magnetic field across the *entire width* of the conveyor belt . . . plus a field *long* enough to snatch tramp iron out of heavily-loaded, fast-moving conveyor belts. Double-gap magnet construction not only provides uniform magnetic strength, but is also the most powerful suspended magnet design available . . . allowing heavier belt loads at higher speeds while still maintaining positive, economical tramp iron removal.

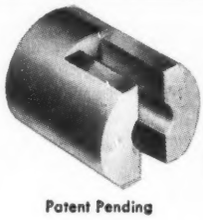
Dings Catalog No. 301 contains full information on Rectangular Suspended Magnets. Ask for it today.

**Dings Magnetic Separator Co.**
4720 W. McGeogh Ave. Milwaukee 14, Wis.

*"Separation Headquarters Since 1899"*

**Dings**
**"HIGH INTENSITY"**

At left is shown how Dings Double-Gap Rectangular Magnet field provides concentrated magnetic strength along its entire length. At right is end-section of magnet showing why a Dings magnet no wider than belt may be used satisfactorily. Note full range magnetic power across entire belt width.



Patent Pending

**DINGS Magnetic Drill Extractor**
**(Non-Electric)**

● Removes broken drill rods and drill bits quickly and easily! Dings new Magnetic Drill Extractor is made of Alnico magnet steel . . . lifts 25 to 40 times its own weight . . . can be carried in a pocket . . . put to use in a few seconds . . . pays for itself in a hurry through holes and re-drilling saved. Write for data sheet containing full information . . . sizes and prices.